

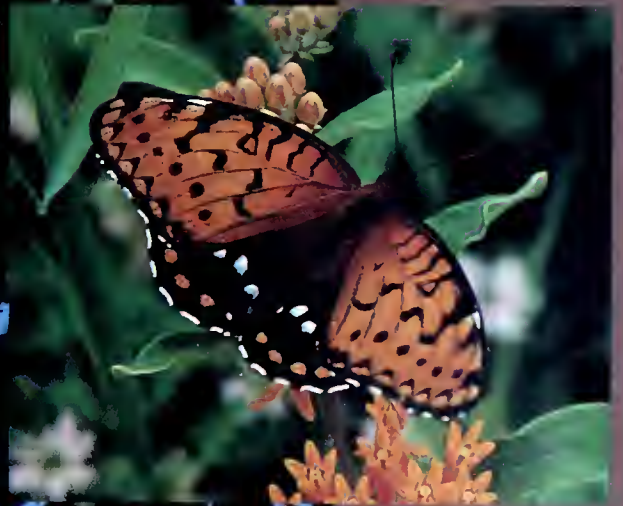
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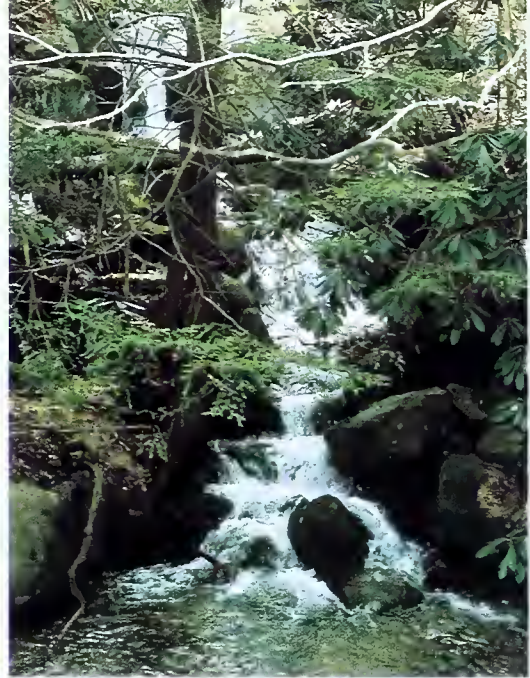


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Endangered and Threatened **SPECIES of PENNSYLVANIA**





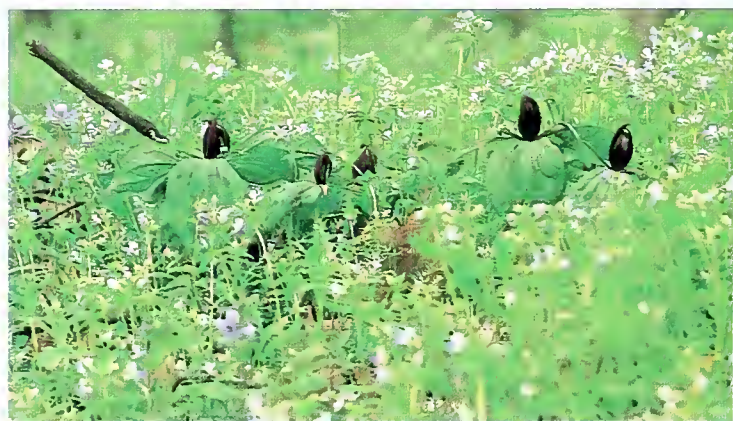
Kathy McKenna, Bureau of Forestry



Mike Whorley, CNS

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and aesthetic values of the environment. Pennsylvania's resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.

– Section 27, Article 1 of the Pennsylvania State Constitution



Mike Whorley, CNS

Endangered and Threatened SPECIES of PENNSYLVANIA

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**Pennsylvania Game Commission
Pennsylvania Fish & Boat Commission
Department of Forestry**

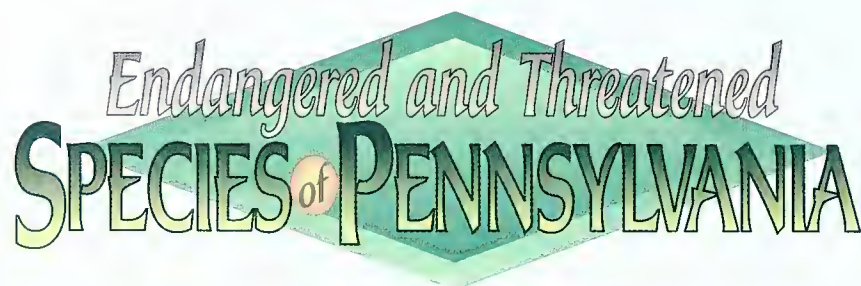
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Endangered and Threatened SPECIES of PENNSYLVANIA

Published by the

Wild Resource Conservation Fund
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Editorial

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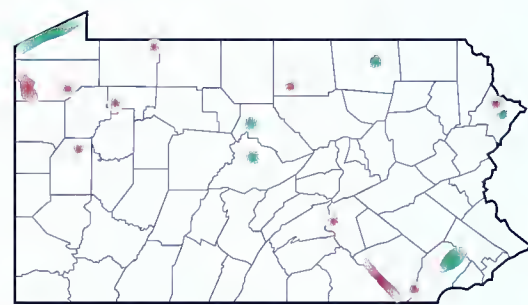
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Green areas represent species records collected by scientists in the past. Information to describe these records has been gathered from museums, institutions and personal collections then entered into the Pennsylvania Natural Diversity Inventory (PNDI). In some cases, current field surveys have found these historically known locations to have been lost to habitat destruction. In other cases, plants and animals have not been located because past records are not specific enough to direct researchers to previously documented sites. Although historical records may not completely reflect the known range of a particular species, they are the best documentation available to estimate the former distribution of the Commonwealth's plants and animals.

Red areas represent species locations that are known to exist today. Many of these sites were found based on directions given in historical records, others were found by looking for species in appropriate habitats. Species ranges were identified using the PNDI information system.

PNDI is organized by computer, map, and manual files that describe locations of endangered, threatened and rare species and the most outstanding examples of the state's natural community and geologic features. PNDI was established in 1980 as a cooperative project of the Bureau of Forestry, The Nature Conservancy and Western Pennsylvania Conservancy, and is a member of the Association for Biodiversity Information.



● = verified after 1980 ● = historical occurrences

Definitions

Endangered: Species in imminent danger of extinction or extirpation throughout their range in Pennsylvania

ENDANGERED

Threatened: Species that may become endangered within the foreseeable future throughout their range in Pennsylvania

THREATENED

Extirpated: Species that have disappeared from Pennsylvania but still exist elsewhere

Extinct: Species that occurred in Pennsylvania but no longer exist across their entire range

Introduction

“The air is sweet and clear, and the heavens serene...Of living creatures, fish, fowl and the beasts of the wood, here are divers sorts...”

In 1683, William Penn gave this account of his new province to a friend back in England. He described with great acclaim and wonder the numerous mammals, fishes, birds, shellfish and plants which he observed on his travels throughout Pennsylvania.

The early settlers prospered on the bountiful natural resources of the commonwealth, as did the immigrants that followed. Unfortunately, the population growth of Pennsylvania over the past three centuries has taken a heavy toll on the plants and wildlife.

Today, only remnants of a once vast and rich natural state remain to support Pennsylvania's native species. More than 350 of these species are currently at risk of being lost from the commonwealth. Many of these species are featured in this booklet.

The loss of species is due primarily from habitat destruction and degradation. The clearing of land for agriculture, and residential and industrial development are the greatest threats to our natural heritage. Secondary impacts include pollution and introduction of aggressive, non-native species that invade native habitats.

Pennsylvania's resource agencies realized the plight of our native plants and animals and initiated management programs to halt the spiraling loss. The Game Commission, Fish & Boat Commission and Department of Conservation and Natural Resources, with support from the Wild Resource Conservation Fund, began to locate and protect remaining locations of our endangered and threatened species. This booklet is a joint effort of these agencies to increase understanding about the reasons for endangerment and the programs designed to protect our imperiled plants and animals.

Every citizen has a role in protecting critical habitats of Pennsylvania's endangered and threatened species. Stronger community efforts are needed to protect wetlands, mature forests, and other critical areas. It is hoped that this publication will educate and heighten the awareness of Pennsylvanians of the natural resource problems here. Working together, we can save and restore some of the natural wonder and beauty experienced by William Penn, and pass along a healthier, diverse environment to future generations.

Pennsylvania's Invertebrates of Special Concern

The animals constituting the loosely used term “invertebrates,” comprise the large majority of Pennsylvania’s animals. It’s been estimated that when all the sponges, planaria, snails, spiders, millipedes, moths, beetles and other insects are added, the total would be a staggering 15,000+ species—or roughly 70 percent of all of Pennsylvania’s flora and fauna. Unfortunately, little is known about this large group.

Aside from their sheer numbers, these no-backbone animals are a key foundation block upon which all ecological systems depend. Hundreds of different birds and mammals, for example, depend upon invertebrate populations as food sources, and many of the higher plants rely on invertebrate pollinators and seed dispersers. Yet with all of this tremendous—in fact, critical—importance, there is one animal in particular that has yet to fully appreciate invertebrates—man.

Great strides have been made in natural resource conservation, but invertebrate animals—along with fungi, lichens, algae and a few other key groups of living organisms—have often not been included in these efforts. Although society obviously appreciates some invertebrates, such as the honey bee and its role in the pollination of agricultural crops, the understanding and, in turn, conservation of most invertebrates has lagged far behind.

Mammals, birds, reptiles, amphibians, fish and vascular plants—the larger, more obvious life forms—have official state agencies responsible for their protection and management. On the other hand, with the exception that aquatic organisms are managed by the Fish and Boat Commission, most invertebrates do not fall under the trusteeship of any such caretaker.

Fortunately, the U.S. Endangered Species Act applies to all living species, so at least some attention is focused upon invertebrates thought to be threatened or endangered on a national level. The butterfly exemplified in this booklet has no official status in Pennsylvania, but it is classified as a “Candidate for Review” by the U. S. Fish & Wildlife Service under the federal act. The decline of the once widespread and regularly found regal fritillary is both mysterious and alarming. Is this animal’s plight another signal of an illness in our environment?

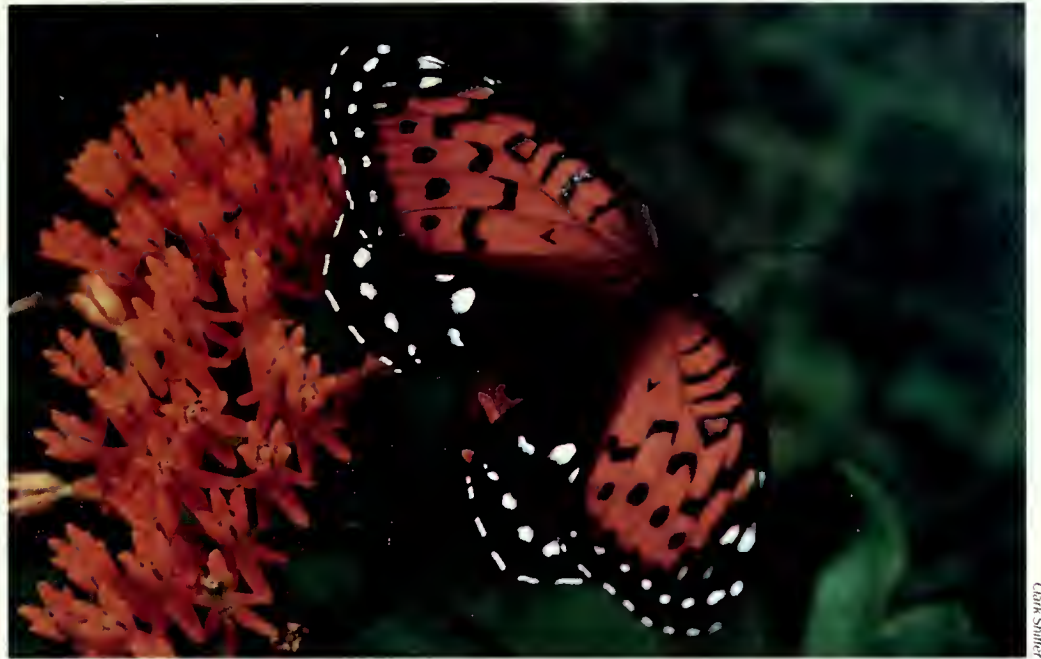
Invertebrates are excellent environmental quality barometers. Nonetheless, virtually no attention has been paid to the plight of the fritillary or virtually any other non-aquatic invertebrate. Of the 100 or so species of butterflies and skippers in our state, many are just as worthy of attention as the regal fritillary.

The northern riffleshell belongs to the family of organisms that has experienced the greatest decline and extinction of any group of species in North America: freshwater mussels. Of the 65 or so original native Pennsylvania species, 18 are no longer found here and another 20 should probably be classified as endangered or threatened. Several of the remaining 27 have also declined. Seven mussels have been listed as Endangered under the U.S. Endangered Species Act. Nine Pennsylvania mussels have been listed as endangered under the U.S. Endangered Species Act, but seven of these are already extirpated in our state.

Although these are the only two invertebrates featured in this booklet, dozens of others have fascinating stories of their own. The Pennsylvania Biological Survey, a nonprofit research, education and conservation organization, is composed of representatives from governmental resource agencies, scientific institutions and conservation groups. The Survey’s Invertebrate Technical Committee is presently investigating issues related to Pennsylvania’s invertebrate resources, including the need for a state agency responsible for the myriad of interesting and diverse invertebrate groups.—Charles W. Bier, Associate Director, Natural Science & Stewardship, Western Pennsylvania Conservancy, 316 Fourth Ave., Pittsburgh, PA 15222, 412-288-2777.

Regal Fritillary

Speyeria idalia



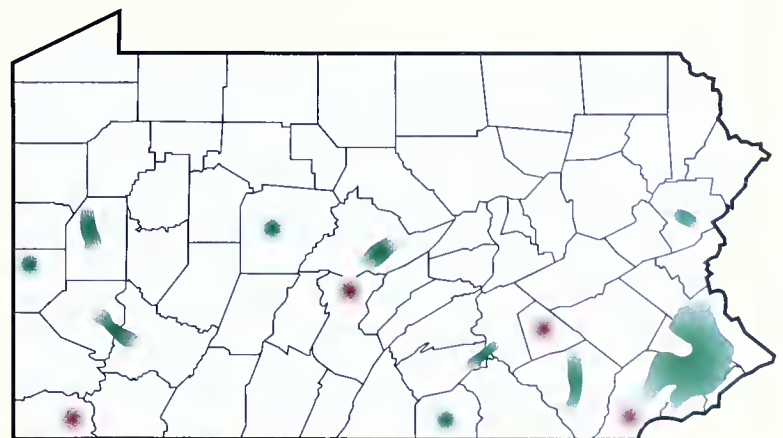
IDENTIFYING CHARACTERISTICS: Our only large, reddish-orange butterfly with forewings variously spotted and marked with black, and the upper surfaces of the hind wings greatly darkened (blue-black in the larger female) and marked by two rows of large spots. The inner row is white in both sexes; the outer row white in the female, orange in the male.

BIOLOGY-NATURAL HISTORY: Adults may be found from late May to mid-October, but most males are active between mid-June and mid-July, and females between early July and mid-August. Flight each day is low and steady, after an early morning period of "sunbathing." Both sexes imbibe nectar from various milkweeds and thistles. Females deposit eggs primarily in late summer on various plants as they walk through vegetation close to the ground. Eggs hatch in the fall, and the young larvae (caterpillars) overwinter. Growth is rapid during the following spring and early summer as the larvae feed at night, only on various violets. The mature larva is velvet black with yellowish or orange mottlings and six rows of barbed spines, which are silver with black tips along the back, and yellow-orange at the base along the sides. When mature, the larva pupates and completes its development to the adult stage within a chrysalis with a brown and yellow abdomen and pink-brown wing cases, both spotted with scattered dark brown patches.

PREFERRED HABITAT: The regal fritillary requires open damp meadows, old fields or pastures with marshy or boggy patches which also support the violets, milkweeds, thistles and other nectar sources the animal requires.

REASONS FOR CONCERN: Further study is necessary before listing this ancient North American species as a federal endangered or threatened species. It no longer occurs in the Canadian Maritime provinces and most of New England. It occurs only in local colonies in its limited Appalachian, northern and mid-western range, largely because of the habitat destruction and/or disruption of critical stages of its life cycle.

MANAGEMENT PROGRAMS: Either formal or informal habitat protection agreements have been made with the owners of public and private properties supporting the few viable colonies remaining in Pennsylvania. Field surveys have been made to determine the status of historical and new sites, and to determine the nature of necessary changes in planned public use projects where regal fritillary habitat is involved.



● = verified after 1980 ● = historical occurrences

Northern Riffleshell

Epioblasma torulosa rangiana



Charles Bier, Western Pennsylvania Conservancy

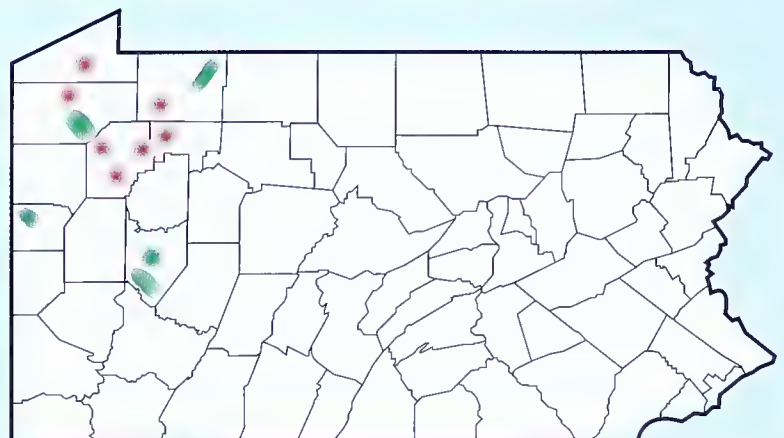
IDENTIFYING CHARACTERISTICS: A small to medium size mussel with an oval shaped shell 2-3 $\frac{3}{4}$ inches long and 1-2 $\frac{1}{2}$ inches high. Base color is light tan to olive-green with numerous fine greenish wavy lines radiating outward. Male and female shells are of different shapes (see photo). Internal shape of a dead shell aids in identification.

BIOLOGY-NATURAL HISTORY: All 65 species of PA's freshwater mussels filter food and absorb dissolved oxygen from water drawn in and released by way of a tubular siphon system. A muscular "foot" allows some slow movement, but this species, like most others, is largely sedentary. The male discharges sperm into the surrounding water, which fertilizes eggs when siphoned in by a mature female. After gestation, tiny larvae are discharged and quickly attach to certain fish for several days before dropping to the stream bottom where they grow, adding concentric rings of shell material similar to the growth rings of a tree. The life span of the riffleshell is about 15-20 years; much less than other species. Predators include the muskrat and raccoon.

PREFERRED HABITAT: The mussel occupies swift runs and riffles with beds of clean gravel, sand and stones. In Pennsylvania it has been recorded from streams ranging from medium size creeks to large rivers in drainages of glacial landscapes of the Ohio River basin. The riffleshell shuns areas of calm water or deep silt.

REASONS FOR BEING ENDANGERED: Imperilled throughout its range, the surviving Pennsylvania populations are some of the best remaining in the world. Water pollution, dam construction and dredging are the major causes for its decline, but other threats include stream sedimentation, channelization and reduced host fish populations. The *Epioblasma* mussels are some of the most environmentally sensitive species in North America.

MANAGEMENT PROGRAMS: In Pennsylvania, the Pennsylvania Fish & Boat Commission holds responsibility for aquatic organisms and is supporting on-going research to describe the riffleshell's range and status. Threats to this species should be monitored. The host fish or fishes needs to be identified. Because the host fish is the critical factor in the reproductive cycle and allow for dispersal, such fish must also be protected. If damaged habitat is reclaimed, the northern riffleshell might expand to recolonize parts of its earlier range.



● = verified after 1980 ● = historical occurrences

American Bittern

Botaurus lentiginosus

IDENTIFYING CHARACTERISTICS: This large, cryptically-colored heron is most often seen when flushed from marshes. It's most easily identified by its large size—up to 34 inches tall and with a 50-inch wingspan—and its streaked brown plumage. At rest, its black moustache-like cheek markings are diagnostic. In flight, conspicuous black outer wings are characteristic. The secretive American bittern may be best known for its habit, when it feels threatened, of standing upright with its bill pointing upward. At times it even sways from side to side, moving like the tall reeds and grasses surrounding it. In this pose the bird blends in with its surroundings and easily goes unnoticed.



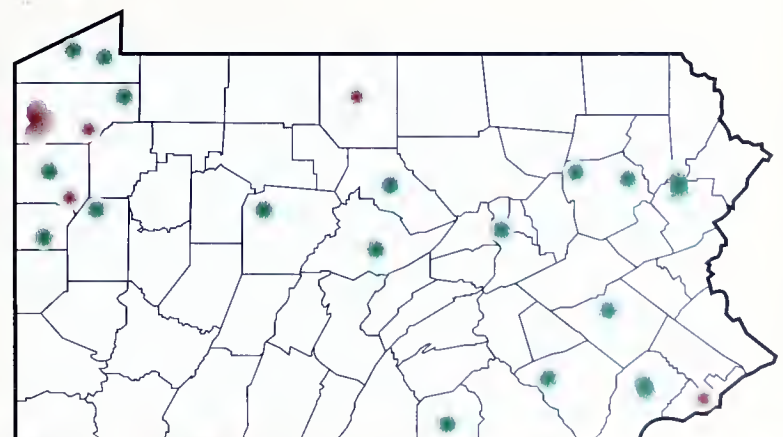
Many Tremaine, Cornell Lab of Ornithology

BIOLOGY-NATURAL HISTORY: American bitterns nest in marshes across the northern United States and southern Canada. They winter across the southern United States and down through Mexico and Central America. They nest singly, not in colonies like many other herons. This species may be found the year round in Pennsylvania, but bitterns are most often seen here during spring and fall migrations. A few nest in scattered marshes across Pennsylvania, particularly, in the Pymatuning area, in our northwest corner. American bitterns build platform nests of reeds and grasses near the water, and normally lay a clutch of three to seven buff- or olive-brown eggs. Young hatch in 24 to 28 days and leave the nest after another two weeks. They are often seen stalking along shorelines and marshes where they prey on frogs, fish, snakes, crayfish, insects and other aquatic organisms.

PREFERRED HABITAT: American bitterns require wetland habitats. They are most likely found in marshes and wetland borders along lakes, ponds, rivers and streams.

REASONS FOR BEING THREATENED: The American bittern is considered threatened because of the continuing disappearance of the wetland habitats it needs to exist.

MANAGEMENT PROGRAMS: Areas in Pennsylvania where American bitterns regularly nest need to be identified and, where possible, protected from development.



● = verified after 1980 ● = historical occurrences

Bald Eagle

Haliaeetus leucocephalus

IDENTIFYING CHARACTERISTICS: Bald eagles are among the largest birds of prey. They may weigh up to 14 pounds and sport 7-foot wingspans. Bald eagles are most readily identified by their white heads and tails, however, they don't attain this characteristic plumage until five years of age. Until that time they are dark brown with varying amounts of white mottling.



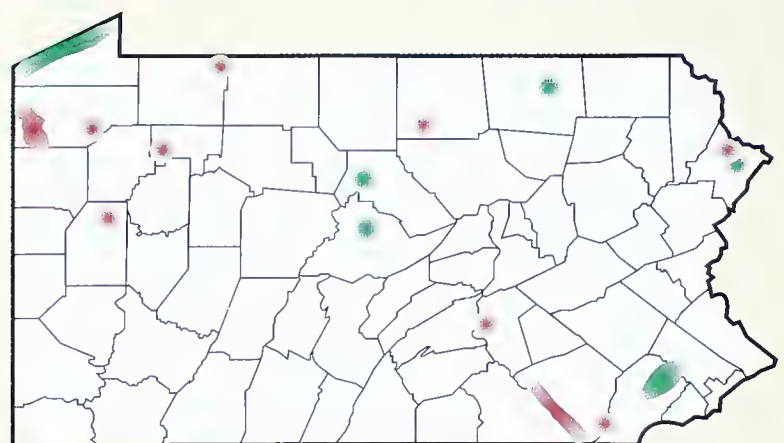
Hai Kober

BIOLOGY-NATURAL HISTORY: Bald eagles may be found throughout North America, most often around water where they scavenge on fish. Other carrion, captured fish and live small animals are also among their prey. Eagles don't reach adulthood and begin nesting until age four or five. They nest in large trees near water, and normally produce one to three young per year. Adults will continue using and seasonally add to the same nest for years. Today, thanks to recovery efforts, bald eagles are nesting across the state. Nonbreeding adults and subadults may be found throughout the state at any time of year.

PREFERRED HABITAT: Bald eagles thrive around bodies of water where adequate food exists and human disturbance is limited.

REASONS FOR BEING ENDANGERED: Water pollution made many areas of the state—and continent—unsuitable for eagles, and many former nesting sites have been lost to human development and encroachment. But the primary reason for the eagle's decline was the effect of the pesticide DDT and its derivatives on eagle reproduction. It accumulated in eagles and caused their eggs to be too thin to withstand incubation. As a result, the bald eagle population plummeted. In 1972, the use of this pesticide in the United States was outlawed, and this drastic decline halted.

MANAGEMENT PRACTICES: The future looks bright for bald eagles in the state. To hasten the return of breeding bald eagles, from 1983 through 1989, the Game Commission raised and released 88 eaglets. Some of these birds have since returned to build nests and raise young. When discovered, new nest sites are protected and production is monitored.



● = verified after 1980 ● = historical occurrences

Black Tern

Childonias niger



B. D. Corneille, Cornell Lab of Ornithology

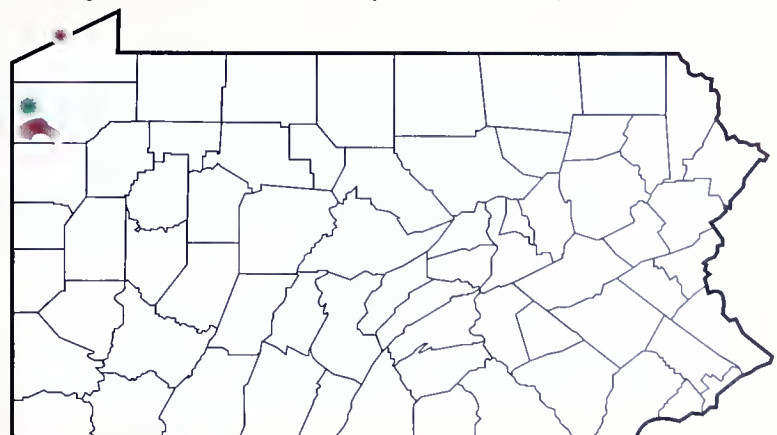
IDENTIFYING CHARACTERISTICS: Terns are slender, graceful fliers with long pointed wings. They are often associated with coastal environments, but the black tern is found inland. During the breeding season this bird is relatively easy to identify because it is the only all black tern. In the fall, juveniles and molting adults have black and white mottled plumages. Flashing light underwing linings make the black tern especially conspicuous in flight.

BIOLOGY-NATURAL HISTORY: Black terns nest across the northern United States and southern Canada, and winter in South America. They are regularly seen migrating through Pennsylvania, appearing in April and May, and then again in August. Nonbreeding adults can be found here in the summers, but our northwest corner is the only place in the state where they nest. This area represents the southeast extreme in the species' breeding range. These terns build fragile cup-shaped nests in reeds or on floating masses of dead plants, just above the water. A typical clutch consists of three olive or buff-brown marked eggs. Young hatch in three weeks, and first fly at three or four weeks of age. Black terns are primarily insectivorous, snatching up insects in flight. They also eat small fish and crustaceans which they pluck from the water surface.

PREFERRED HABITAT: Black terns leave coastal areas behind and come inland to nest in prairies and in the more extensive deep-water marshes or marsh complexes. Winter finds them back along the coast, often with other terns.

REASONS FOR BEING ENDANGERED: As black tern nesting colonies here are small and localized, they are extremely susceptible to both man-caused and natural disasters. In addition, the number of black terns nesting here has been declining over recent years.

MANAGEMENT PROGRAMS: Pennsylvania's black terns need to be annually monitored. After it's learned where and how many black terns are nesting here, measures may be taken to protect and expand their natural habitat. But, as Pennsylvania lies on the margin of this species' breeding range, the birds may not ever be found here in significant numbers.



● = verified after 1980 ● = historical occurrences

Delmarva Fox Squirrel

Sciurus niger cinerus



Pennsylvania Game Commission

IDENTIFYING CHARACTERISTICS:

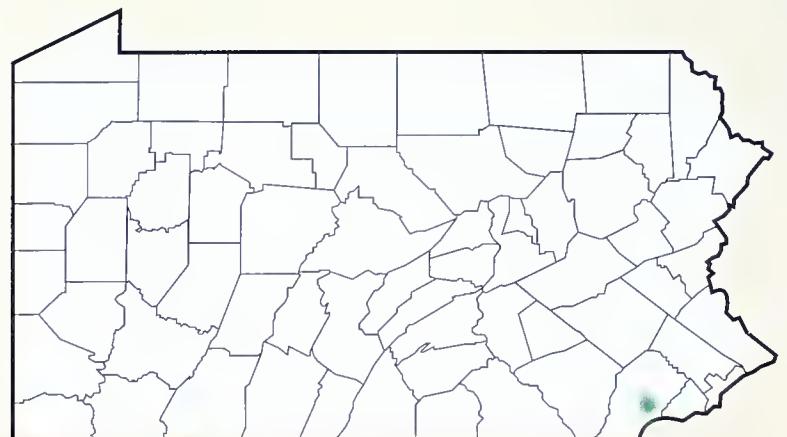
Averaging 2½ to three pounds, the Delmarva fox squirrel is up to twice as large as the common gray squirrel. The light, whitish-gray coat of the Delmarva also is a distinguishing characteristic. The feet are white and the tail has a pronounced black stripe on the outer edge.

BIOLOGY-NATURAL HISTORY: The historic range of this squirrel was southeastern Pennsylvania and southern New Jersey and in the Delaware, Maryland and Virginia portions of the Delmarva Peninsula. Today, it is mainly limited to several counties in Maryland and the Chincoteague National Wildlife Refuge in Virginia. Delmarvas were absent from Pennsylvania for the better part of this century or longer. Between April 1987 and October 1988, 20 Delmarvas were translocated from Maryland to a site in Chester County. Pending additional introductions, it is too soon to predict the outcome of this restoration attempt. Food seems to dictate litter size (two, three or four) and whether one or two litters are produced in a year. Food consists of fruits, seeds, buds and flowers of trees, along with corn and other agricultural products.

PREFERRED HABITAT: Seasonally, this squirrel may range over 40 acres. It spends more time on the ground than gray squirrels and will venture farther into open fields. Its typical habitat consists of woodlots and narrow tree zones along streams intermixed with scant undergrowth.

REASONS FOR BEING ENDANGERED: Cutting of old growth forests and development probably are the primary factors responsible for the last-century extirpation of this species from southeastern Pennsylvania. These are also thought to be two of the main reasons for its status as a federal endangered species. Additionally, in marginal habitat—mature trees with substantial undergrowth and few tree cavities—it is forced to compete with the gray squirrel.

MANAGEMENT PROGRAMS: The national plan to recover this species includes four primary actions: (1) inventory and management of essential habitat; (2) release of Delmarva fox squirrels into suitable habitat; (3) protection of populations; and (4) promotion of public support.



● = verified after 1980 ● = historical occurrences

Eastern Woodrat

Neotoma magister



Rob C. Howell

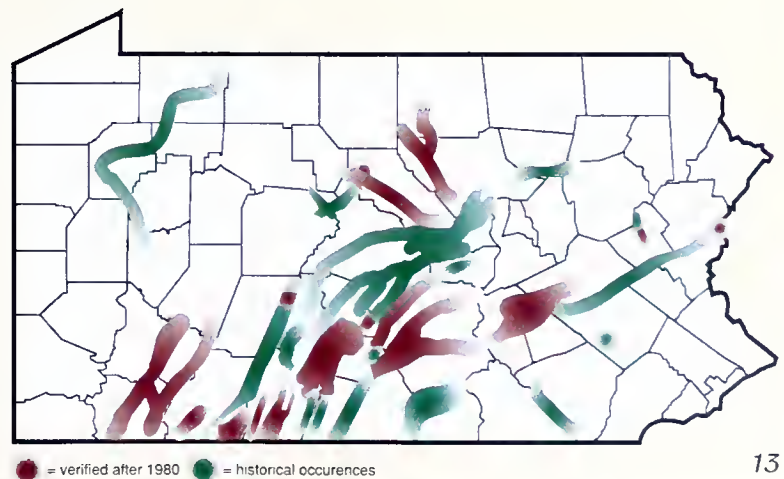
IDENTIFYING CHARACTERISTICS: The eastern woodrat is an eastern relative of the much better known packrat of the West. It is buffy gray above, with white underparts and paws. An adult averages just over a pound, and 17 inches in length, including an 8-inch tail. Its ears are large and may appear naked. The eastern woodrat is distinguished from the Norway rat—the only animal in Pennsylvania for which it may be confused—by its hairy, bicolored tail; the Norway rat has a naked tail.

BIOLOGY-NATURAL HISTORY: This animal is found along the Appalachian mountains, from northern Alabama to northeastern New Jersey. In Pennsylvania the eastern woodrat was historically found throughout the mountainous parts of the state, but recent surveys indicate its range here has diminished, with most colonies found west of the Susquehanna River. The presence of eastern woodrats is most often determined by characteristic toilet areas. Less frequently, surveyors find their bulky nests made of twigs and bark, built on ledges or in caves, or piles of fresh herbaceous vegetation stored under rock overhangs. The breeding season runs from February until September, during which up to three litters containing two or three young each may be produced.

PREFERRED HABITAT: The eastern woodrat does not thrive around civilization. It prefers rock strewn sites, usually mountaintops and valley sides. There, under tree canopy, a cave or boulders provide the network of subsurface crevices that shelter woodrats. This and their nocturnal habits make the woodrats largely unknown among the general public.

REASONS FOR BEING THREATENED: The eastern woodrat has been classified as threatened because populations have suffered significant declines across the northern part of its range. The woodrat is no longer found in Connecticut and New York. In Pennsylvania they are absent from many historic sites, particularly in the eastern part of the state. Where they persist, their numbers are low.

MANAGEMENT PROGRAMS: Little is known about the woodrat's requirements. Before any management procedures can be developed, more detailed life history characteristics need to be learned, including more precise information concerning its movements, habitat requirements, and the reasons for its apparent decline.



● = verified after 1980 ● = historical occurrences

Great Egret

Casmerodius albus



C. Singletary, Cornell Lab of Ornithology

IDENTIFYING CHARACTERISTICS:

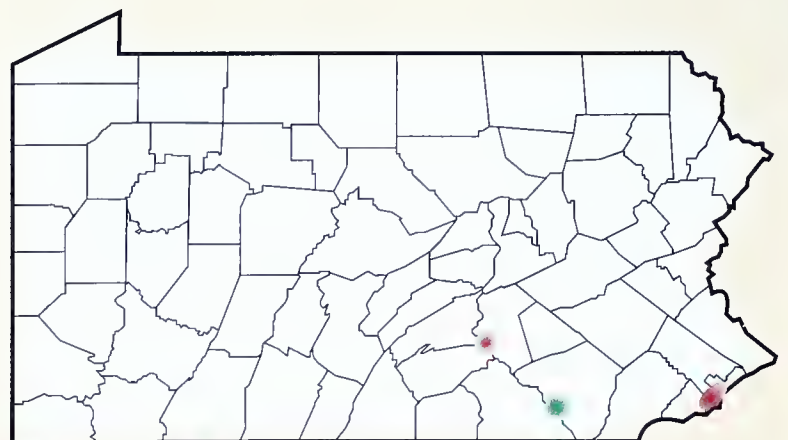
From bill to tail tip, adults are about 40 inches long. The wingspan is 55 inches. The plumage is white, bill yellowish, and legs and feet black.

BIOLOGY-NATURAL HISTORY: The major distribution of this species is south of Pennsylvania. Fingers of a Mid-Atlantic coastal population extend into the Delaware and Susquehanna drainages. During migration, this species drifts slowly southward. By mid-spring, nesting has started. A nest of sticks contains three to four pale bluish green eggs. After a 24-day incubation period and six weeks as nestlings, young are ready to fly. Maturity may not be reached until the third year. Food consists of frogs, minnows and other small aquatic animals.

PREFERRED HABITAT: This egret is typically found feeding in shallow rivers, streams, ponds, lakes and marshes. Nests are found in adjacent trees or shrubby growth, preferably on islands. The birds usually nest in colonies that may include other colonial nesting species.

REASONS FOR BEING THREATENED: Years ago, this species was hunted for its feathers. By 1917, some doubted this species could be saved from extinction. Pennsylvania's first documented nesting record was in 1957. By 1990, birds had established three modest colonies here. Today, the main threats faced by the great egret is habitat loss (inundation of shallow feeding areas as a result of dams, for example), water pollution, and disturbance of nesting colonies.

MANAGEMENT PROGRAMS: Colonial nesting birds are vulnerable to disturbance and direct persecution. All known nesting colonies should be closed to public intrusion and preserved from development pressures.



● = verified after 1980 ● = historical occurrences

Indiana Bat

Myotis sodalis



Merlin Tuttle

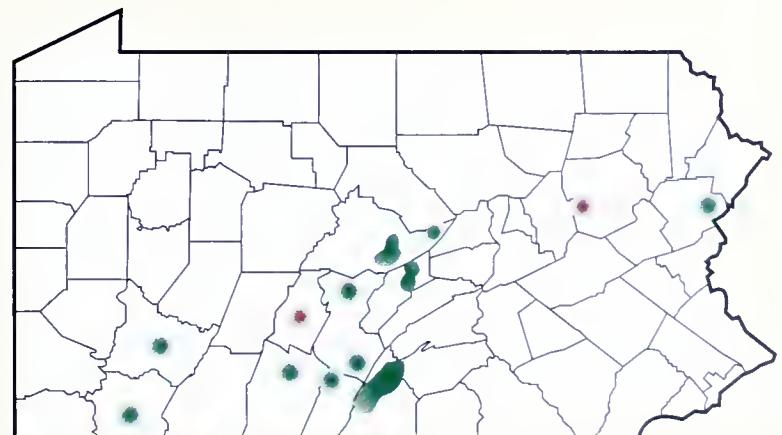
IDENTIFYING CHARACTERISTICS: The Indiana bat is difficult to distinguish from other species of bats, but three characteristics permit accurate identification. Unlike the common little brown bat, which has black-brown lips, the Indiana bat has pink lips. This characteristic is useful when a cluster of hibernating bats is encountered. The Indiana bat has a smaller hind foot with short hairs on the toes and a calcar (a spur extending from the foot) with a slight keel. The hair of the Indiana bat is black the first two-thirds of its length and then gradually fades to gray. The color of the tip varies from dark gray to black, or dark brown to brown. The hairs of the little brown bat, however, distinctly change from black to gray, and are black to brown on the tip.

BIOLOGY-NATURAL HISTORY: The Indiana bat was the last Pennsylvania mammal to become known to science. It was not described as a species until 1928. The Indiana bat occurs in the eastern half of the United States, from northern Alabama up through New England. In Pennsylvania it was historically found hibernating in caves in the Appalachian Mountains in the central part of the state, with a possible preference for those that were wet or contained pools or streams. Little is known about the Indiana bat when it's not hibernating. They apparently disperse widely over the countryside in summer. A few females and young have been found during the summer, resting behind loose pieces of bark.

PREFERRED HABITAT: Indiana bats apparently require specific atmospheric conditions for hibernation, namely, temperatures between 39 and 45 degrees F, and a relative humidity from 66 to 95 percent.

REASONS FOR BEING ENDANGERED: The Indiana bat is a federally listed endangered species. In the 1930s hibernating groups containing thousands of Indiana bats were found, but recent surveys of these same sites indicate a drastic decline. Man-caused changes to cave climates have caused an estimated 50 percent of the recent decline. Disturbance or vandalism during hibernation is another reason. These practices disrupt bats, causing them to burn up fat reserves, which lessens their chances of surviving until spring.

MANAGEMENT PRACTICES: Known hibernation sites in Pennsylvania have been gated to exclude human access. Surveys are conducted on a regular schedule to monitor changes in the number of Indiana bats hibernating at these sites.



● = verified after 1980 ● = historical occurrences

King Rail

Rallus elegans



Lawrence Males, Cornell Lab of Ornithology

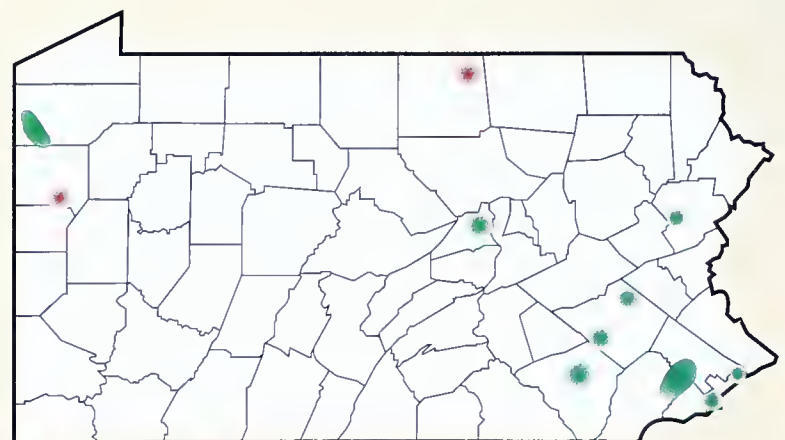
IDENTIFYING CHARACTERISTICS: The king rail is so named because of its large size and bright coloration. This plump chicken-sized bird is a bright rusty color. They range from 15 to 19 inches in height and have 21- to 25-inch wingspans. Males are larger than females. Bills are long, slightly decurved, and yellow with brown tips. These birds are extremely secretive and would rather run than fly to escape detection. They are rarely seen, therefore, and are most often located by their loud calls, a resonant grunting bup-bup, bup, bup, bup, more rapid at the end.

BIOLOGY-NATURAL HISTORY: King rail nests are platforms up to nine inches in diameter, six to 18 inches above the water. They are built of grasses, sedges and cattails in shallow water marshes, and roadside ditches. From six to 15 pale, slightly spotted brown eggs are laid in a shallow depression of the nest. Overhead cover is often pulled over the nest. Young are able to fly about 60 days after hatching. Wading in shallow water, king rails feed on crustaceans, small fish, frogs and insects. In winter, food items consist of grains—particularly rice—and berries.

PREFERRED HABITAT: This rail lives in freshwater and brackish marshes and roadside ditches in eastern North America, primarily along the Atlantic coast. It is a very rare breeder in the few larger marshes remaining in Pennsylvania.

REASONS FOR BEING ENDANGERED: King rails were never common in Pennsylvania, but annual reports indicate the bird today is much less abundant than historically. This apparent decline is considered to be due primarily to losses of marshland habitat.

MANAGEMENT PRACTICES: As with many other endangered and threatened species, the king rail needs wetlands in order to exist. Maintaining stable water levels during the summer will enhance the species' breeding success here.



● = verified after 1980 ● = historical occurrences

Least Bittern

Ixobrychus exilis

IDENTIFYING CHARACTERISTICS: The smallest member of the heron family, the least bittern is 11 to 14 inches in length and has a 16- to 18-inch wingspan. This primarily black and tan bird has a blackish-green cap and back, brown neck and underparts, and a white throat. The least bittern is most readily identified in flight by conspicuous, light, chestnut-colored wing patches. A rare, darker phase also exists. When disturbed, the least bittern is more likely to run than fly, and like its relative, the American bittern, it also has the habit of freezing with its bill pointed straight up when alarmed.



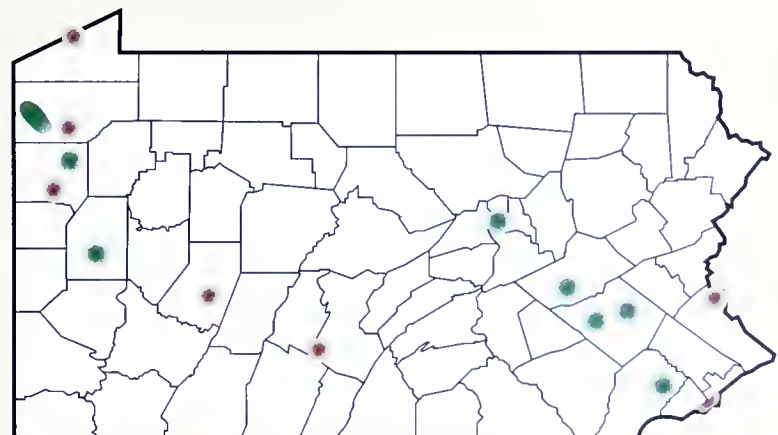
A & E Morris WREO

BIOLOGY-NATURAL HISTORY: The least bittern nests in wetland areas throughout the eastern United States and along the Pacific coast. It spends the winter from our southern states south to Columbia, South America. This species is a regular migrant through the state, but it nests here only in our northwest and southeast corners, and possibly in a few other locations, but not regularly or in significant numbers. The least bittern arrives in Pennsylvania in April and builds its platform nest of reeds and grasses near open water. Four or five pale blue or green eggs are laid in the 6-inch nest in mid or late May. The young hatch in slightly under three weeks.

PREFERRED HABITAT: Least bitterns thrive in dense marshland environments containing cattails and reeds, along the coast and inland, where they feed primarily on small fish, amphibians, insects and small mammals.

REASONS FOR BEING THREATENED: Nesting opportunities for this species in Pennsylvania are limited and decreasing as the wetland habitat it needs have been extensively drained or impounded.

MANAGEMENT PROGRAMS: Areas where this species is known to nest should be protected. Surveys are being conducted to determine where it does actually nest, and marshland habitats can be managed to provide additional nesting habitat.



● = verified after 1980 ● = historical occurrences

Least Shrew

Cryptotis parva



Oregon S. Paulson and James A. Hart

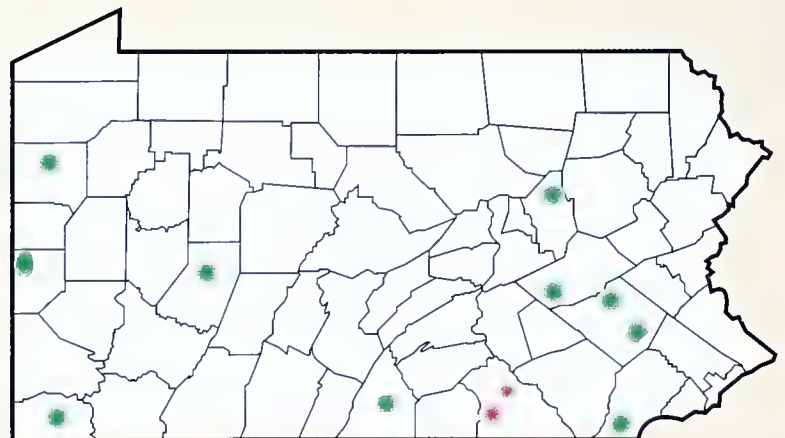
IDENTIFYING CHARACTERISTICS: The total length of an adult least shrew is three to $3\frac{1}{2}$ inches. Its tail length ranges from $\frac{1}{2}$ to $\frac{3}{4}$ inches, which is the shortest tail of all Pennsylvania shrews. It has a black and ashy-gray belly. The only other species of shrew with a short tail, the northern short-tailed shrew, is larger (total length is four to five inches) and is dark slate colored.

BIOLOGY-NATURAL HISTORY: The least shrew is found throughout much of the eastern United States, ranging from Central America north and east to New York and Connecticut. Historically, this species may have been found throughout Pennsylvania. Most records, however, are confined to non-forested habitats in southern and western Pennsylvania. Least shrews have up to three litters, averaging five young per litter, between March and November. Like other shrews, they feed mainly on insects, earthworms and other invertebrates.

PREFERRED HABITAT: Unlike other shrews, this species does not inhabit moist, mature forests. Instead, it lives in meadows, pastures, old fields and other non-forested habitats.

REASONS FOR BEING ENDANGERED: Post-1970 surveys at historic Pennsylvania sites failed to reveal this species. In fact, numerous surveys in likely habitats have resulted in the collection of only three specimens in more than 20 years. Because this is a farmland shrew, it might have declined as a result of "DDT-era" (pre-1972) pesticide use. The loss of croplands to development and more intensive use of remaining farmlands may also be contributing to the apparent decline and current rarity of this shrew.

MANAGEMENT PRACTICES: Management practices beneficial for the short-eared owl and other grassland animals should also benefit the least shrew. Surveys to find this species need to be intensified. If found, populations should be protected. Habitat studies in the vicinity of known populations on public lands should precede restoration efforts.



● = verified after 1980 ● = historical occurrences

Loggerhead Shrike

Lanius ludovicianus



John Gavin, Cornell Lab of Ornithology

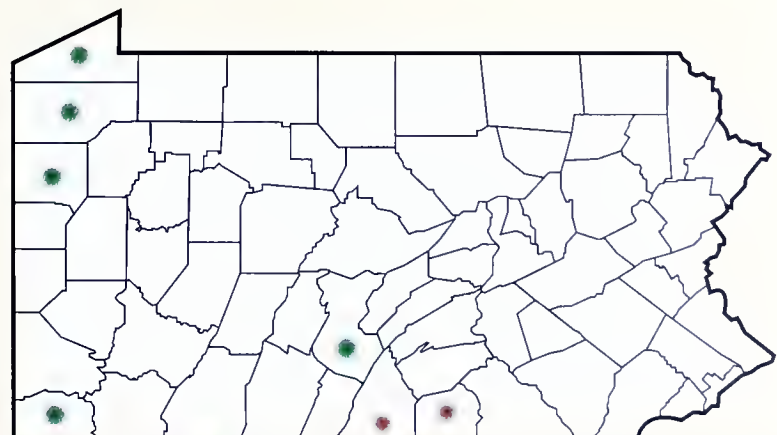
IDENTIFYING CHARACTERISTICS: Shrikes are medium-size, gray and black birds with a white patch on each wing. The loggerhead shrike is similar in size and appearance to a mockingbird. It differs by having a heavier, hooked bill and a black mask that extends across each eye, giving it a “masked” appearance. The loggerhead is distinguished from the winter visitor, the northern shrike, by having a more extensive black mask, which extends over its small bill. Also, the northern shrike pumps its tail, while the loggerhead does not.

BIOLOGY-NATURAL HISTORY: The loggerhead shrike is adapted to catching small birds, mammals and insects. Its strong, hooked bill compensates for its relatively weak feet. Shrikes frequently impale their prey on thorns or barbed wire to retrieve later. They are birds of open country, where they frequently perch on telephone wires or exposed branches. Nests are placed in dense thorn bushes, most often cedars or low hawthorns. A clutch of four to six white eggs, spotted with brown flecks, hatch in 16 days. Not particularly shy of people, the shrikes are susceptible to being hit by cars as they flash across rural roads.

PREFERRED HABITAT: Loggerheads prefer short grass pastures with scattered shrubs and fencerows or small utility lines. Historically, they nested across western Pennsylvania, especially in Erie and Crawford counties—the glaciated area of northwestern Pennsylvania. Recent nestings have occurred in Adams and Franklin counties. In winter, loggerhead shrikes may occur in any county.

REASONS FOR BEING ENDANGERED: Shrikes rely on pastures for the open, short grass conditions needed for hunting prey. This habitat type has decreased during the century, as marginal farmland has been abandoned and as agricultural practices intensify on remaining farms. Shrikes may also be susceptible to contamination by agricultural chemicals, but most studies point to collision with vehicles on country roads as a major factor affecting shrike populations.

MANAGEMENT PROGRAMS: The first loggerhead shrike nests in 55 years were found in 1992. Intensified surveys are needed to determine the extent of the current nesting range. Monitoring is also needed to assure nests are not disturbed. Landowners should be encouraged to manage their pastures to favor shrike habitat.



● = verified after 1980 ● = historical occurrences

Osprey

Pandion haliaetus



Fred K. Truslow, Cornell Lab of Ornithology

IDENTIFYING

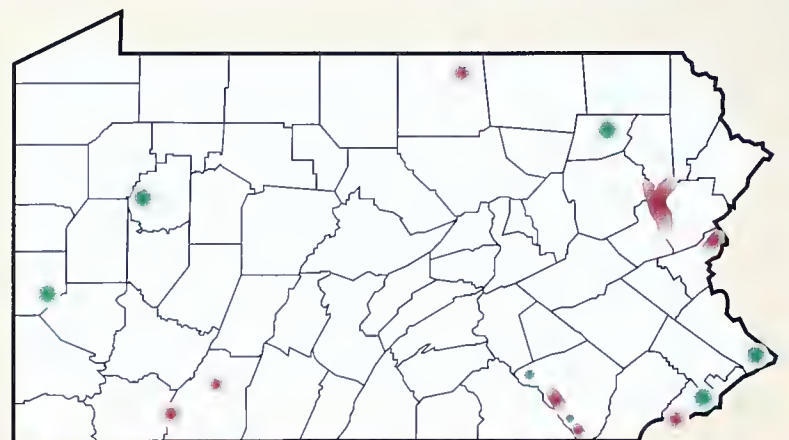
CHARACTERISTICS: Ospreys are large, striking, fish-eating birds of prey most often seen around water. They may exceed 24 inches in length and sport wingspans approaching six feet. Ospreys are dark brown above, bright white below, with some brown streaking across the breast. Key identification characteristics are the prominent dark eye stripes, black patches at the crooks of bent wings, and a characteristic silhouette.

BIOLOGY-NATURAL HISTORY: The osprey is one of the world's most widely distributed birds. They are found along seacoasts and major waterways on every continent except Antarctica. They prey almost exclusively on fish. Ospreys nest in colonies or singly. Their stick nests are large and usually built near water. A breeding pair adds to the nest every year it's occupied. They usually nest in large trees, but they may be found nesting on channel markers, telephone poles, chimneys and man-made platforms built specifically for their use. Usually three eggs are laid.

PREFERRED HABITAT: Ospreys may be found anywhere around open water containing adequate fishing opportunities. In recent years, ospreys have produced young in the Pocono and lower Susquehanna Valley regions of the state, and Somerset County. During spring and summer, nonbreeding subadults can be found throughout the state.

REASONS FOR BEING ENDANGERED: In the early 1900s ospreys nested along the state's rivers and streams, but habitat destruction and water pollution made these areas unsuitable. Osprey populations were further decimated through the effects of pesticides on their reproductive capabilities.

MANAGEMENT PROGRAMS: Between 1980 and 1986, 111 ospreys—obtained as nestlings from burgeoning Chesapeake Bay populations—were hand-reared and released in northeastern Pennsylvania. From 1982 to 1990, more than 30 of these released birds returned as adults and built nests. Through 1990, these birds produced 49 young. Similar releases in Tioga and Butler counties, at the rate of 8 to 12 young per year through 1994, should help extend the breeding population of ospreys farther westward along the headwaters of the Susquehanna and Allegheny. Concurrently, the Chesapeake Bay population is expanding up the Susquehanna River. Management includes monitoring, nest site protection and erection of artificial nest platforms.



● = verified after 1980 ● = historical occurrences

Peregrine Falcon

Falco peregrinus



F. K. SCHNEIDER, VIREO

IDENTIFYING CHARACTERISTICS:

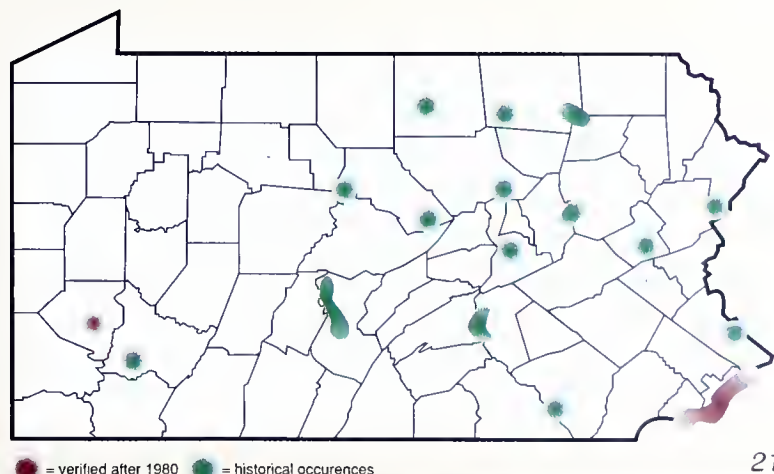
A 15- to 22-inch falcon, adults have dark-bluish gray upperparts and wings. Underparts are whitish to buffy colored, broken by horizontal bars. The head has a nearly black "helmet." Like all falcons, the peregrine has long pointed wings and rapid, steady wing beats in flight.

BIOLOGY-NATURAL HISTORY: The peregrine nests in many parts of the world. In Pennsylvania, peregrines once nested on high cliffs along the Delaware, Susquehanna and Juniata rivers. Nesting records come from at least 21 counties. They feed primarily on other birds, typically by striking them in flight. A clutch of four eggs is normally laid, and the birds may remain in Pennsylvania the year round.

PREFERRED HABITAT: Historically, this falcon nested on high cliffs overlooking river systems. Today, peregrines are more apt to be found nesting on high bridges and tall buildings within cities. As a result, they frequently feed on pigeons and other urban birds. After an absence of 30 years, the return of breeding peregrines to Pennsylvania was first documented on bridges spanning the Delaware and Schuylkill rivers in the Philadelphia area. In 1990, a pair began nesting in Pittsburgh.

REASONS FOR BEING ENDANGERED: By 1961, peregrines were no longer found in Pennsylvania. Their decline and extirpation has been attributed to egg collecting, falconry and shooting, but chiefly to pesticides—particularly DDT.

MANAGEMENT PRACTICES: The plan to restore this species includes annual surveys for new nest sites; protection of known nest sites, including hazard reduction to increase survival of young peregrines; restoration of peregrines at suitable historic sites; and promotion of public support. A reintroduction program has released birds into Harrisburg, Reading, and Williamsport.



Sedge Wren

Cistothorus platensis



Lang Elliott, Cornell Lab of Ornithology

IDENTIFYING CHARACTERISTICS:

The sedge wren, formerly known as the short-billed marsh wren, can best be distinguished from other wrens by its relatively small size. It's only 4½ inches high and has a 6-inch wingspan, streaked crown and back, faint buffy eye stripes, and a short tail which is often held upright.

BIOLOGY-NATURAL HISTORY:

In summer, sedge wrens are found from southern Saskatchewan and Minnesota across the Great Lake States to the east. They winter along the Atlantic and Gulf coasts, down into Mexico. Sedge wrens arrive in Pennsylvania in April and May, and migrate south to brackish coastal marshes from August to October. Among the last birds to nest in the state, sedge wrens may be found nesting here as late as August. They nest in wetland areas; a typical clutch of six or seven white eggs is laid in a globular nest built up to two feet off the ground. Young hatch in 12 to 14 days, and leave the nest at two weeks of age. Two broods can be produced each year.

PREFERRED HABITAT:

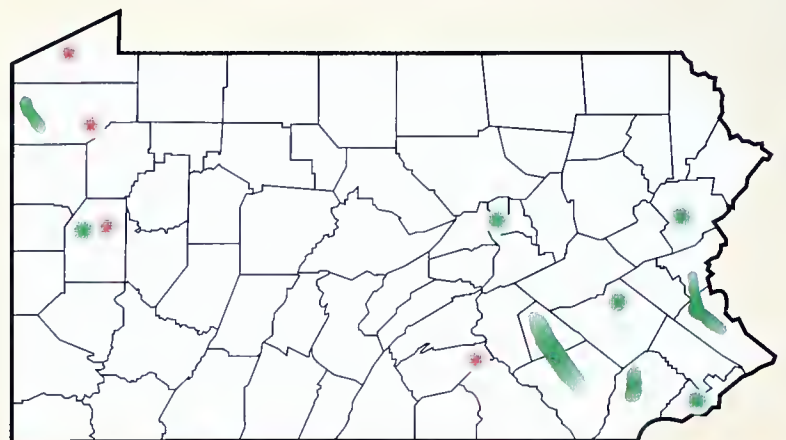
For nesting, sedge wrens require damp meadows and marshes where sedges and grasses are interspersed with small shrubs. They apparently don't do well in cattail marshes.

REASONS FOR BEING THREATENED:

Sedge wrens are rare throughout their range. They used to be found nesting in scattered locations across Pennsylvania. Over the past several decades, however, they have disappeared from many former haunts, and numbers have dropped significantly in others. The loss of habitat and changing agricultural practices are thought to be responsible for this decline.

MANAGEMENT PROGRAMS:

The specific locations where sedge wrens currently nest in the state need to be determined and then, where feasible, protected.



● = verified after 1980 ● = historical occurrences

Short-Eared Owl

Asio flammeus



S. J. Lang, WRECO

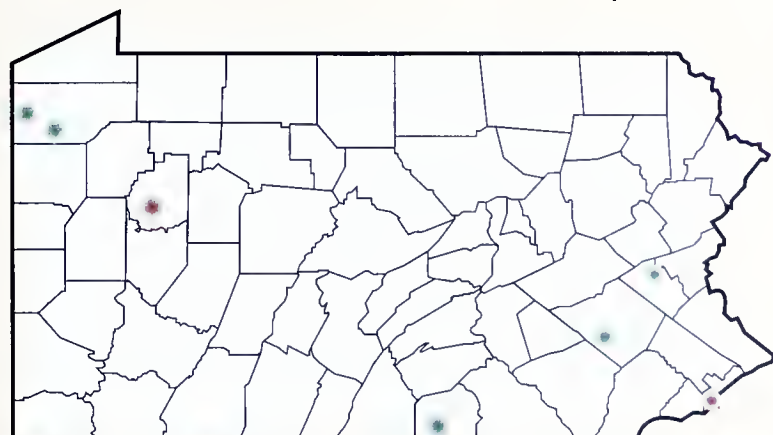
IDENTIFYING CHARACTERISTICS: The short-eared owl received its name from its lack of “ear” tufts. It’s about the size of a crow, 13 to 17 inches high, and has a 38- to 44-inch wingspan. Color is variable, from light to dark brown. The dark patches on undersides of wings, and large buff-color patches on upper sides are most distinctive. There are also dark patches around the eyes.

BIOLOGY-NATURAL HISTORY: Short-eared owls are birds of open country. They may be found in Pennsylvania throughout the year. They nest on the ground, sometimes in colonial groups. The nest is a slight depression, sparsely lined with grass and feathers, often at the base of a clump of weeds or grasses. A normal clutch consists of four to seven white eggs. Young hatch about three weeks after egg laying, and are able to fly in about a month. Unlike most other owls, the short-eared is active at dusk, dawn and—at times—even in mid-day; therefore, they are seen more often than other owl species.

PREFERRED HABITAT: These owls have been nesting in the southeast corner of Pennsylvania, in the marshland and meadows around the Philadelphia International Airport. Recently, they have been found nesting on reclaimed strip mine sites in Clarion County. Short-eared owls are more likely to be encountered here in the winter, when several may be seen together, hovering or flying low and in circles over agricultural fields in search of their main prey, meadow mice.

REASONS FOR BEING ENDANGERED: Suitable nesting habitat for the short-eared owl is extremely limited in Pennsylvania, and intensive agricultural practices make many potential habitats unsuitable.

MANAGEMENT PROGRAMS: In Pennsylvania, most open lands are farmlands and, therefore, subject to repeated disturbance. Accordingly, the welfare of grassland nesting birds is threatened. This may be why the only known nests of short-eared owls were discovered in extensive and low-disturbance open lands, e.g. a strip mine reclaimed to grass. Future management, based on the needs for safe nesting habitat for all grassland nesters, should include the creation of large, herbaceous reserves suitable for all grassland nesters. Such reserves might include airports, reclaimed strip mines and large pastures. Primary management of these areas must assure a disturbance-free nesting season.



Small-Footed Myotis

Myotis leibii



Merlin Tuttle

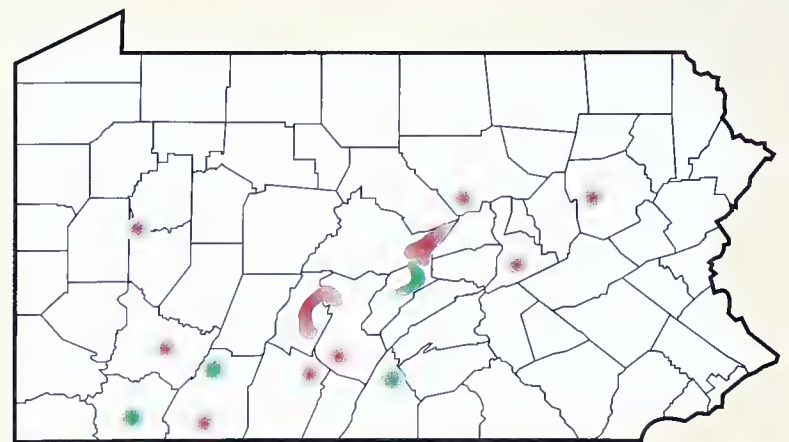
IDENTIFYING CHARACTERISTICS: The small-footed myotis may be distinguished from other small brown bats by its diminutive size ($3\frac{1}{2}$ inches, including a $1\frac{1}{2}$ -inch tail), black face, small feet (less than $\frac{1}{3}$ -inch), and short forearms (less than $1\frac{1}{2}$ inches). Its wing and tail membranes are blackish brown. This bat, however, is so similar in appearance to our most common bat, the little brown bat, and several other species that field identification is difficult. Positive identification is best determined only by examining skull characteristics.

BIOLOGY-NATURAL HISTORY: The small-footed myotis is noted for hibernating closer to cave openings than other bats, and for hibernating alone, not clustered like the more common little brown bat. Because this bat occurs in such small numbers, the likelihood of encountering any outside hibernating areas is extremely remote. Therefore, little is known of this animal's habitats when not in hibernation.

PREFERRED HABITAT: Small-footed bats apparently prefer caves and abandoned mine shafts located in the Allegheny mountains, with a possible preference for those located in hemlock-covered foothills and near water.

REASONS FOR BEING THREATENED: The small-footed myotis has always been considered rare in Pennsylvania, but it is classified as threatened because of an apparent population decline between the 1930s and the late 1970s. Between 1930 and 1944 a mammalogist, Charles E. Mohr, made repeated surveys of hibernating bats in more than 100 caves in Pennsylvania and West Virginia. He found only 363 small-footed myotis, all in only seven of the surveyed caves, and all of these in central Pennsylvania. In 1978 and 1979 these seven caves were surveyed again, and no small-footed myotis were found. Subsequent to 1979, more than 200 abandoned mines and caves were surveyed for hibernating bats. Small-footed bats were found at 32 sites. At 25 of these sites, this species was represented by fewer than five individuals.

MANAGEMENT PROGRAMS: Some caves and mines where this species hibernates have been gated to eliminate human access, as disturbance during this period causes the animals to needlessly expend energy reserves needed to sustain them through the winter. Regular surveys are being conducted to monitor the status of the small-footed bat, and summertime mist-netting at likely caves and overrock-crevices may uncover more about where this species goes at that time.



● = verified after 1980 ● = historical occurrences

Upland Sandpiper

Bartramia longicauda



O. S. Pettigall, Cornell Lab of Ornithology

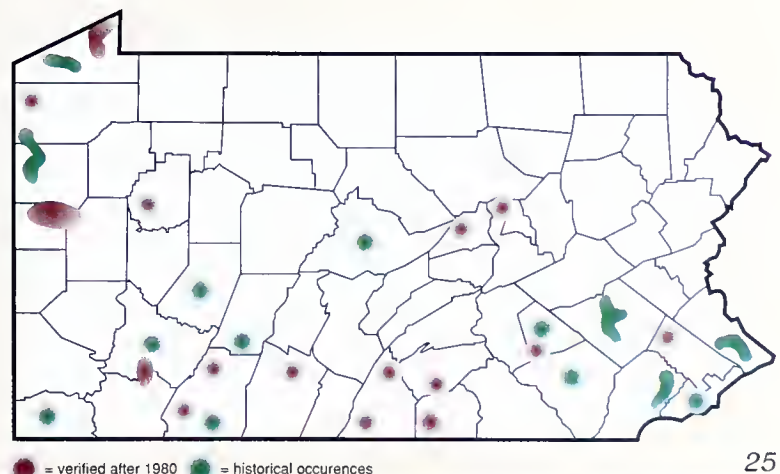
IDENTIFYING CHARACTERISTICS: The upland sandpiper, formerly called the upland plover, is a large light brown shorebird that comes inland to nest. This bird is about 12 inches tall and has a 20-inch wingspan. The upland sandpiper can be identified by its long neck, disproportionately small head, and long tail. Its back and wings are dark brown, its breast is streaked. The upland sandpiper is perhaps most readily identified by its preference for perching on wires and fenceposts, and its habit of holding its wings high above its back for a few moments after alighting.

BIOLOGY-NATURAL HISTORY: Upland sandpipers nest across North America; they winter in South America. These birds arrive in Pennsylvania in April, and then leave in August after nesting. They are almost exclusively insectivorous, feeding primarily on grasshoppers, crickets and weevils. Waste grain and weed seeds are sometimes eaten. This out-of-place shorebird typically nests on the ground in grassy fields. The normal clutch consists of four eggs. Young hatch in about three weeks, and the precocial young leave the nest as soon as the last one hatches. They can fly at about 18 days of age.

PREFERRED HABITAT: Upland sandpipers are birds of open country. They may be found in large fallow fields, pastures and grassy areas.

REASONS FOR BEING THREATENED: Upland sandpipers were once more common than they are today. Around the turn of the century they attracted the attention of market hunters looking for a bird to fill the void created by the decline—and ultimate, extinction—of the passenger pigeon. Loss of farmland and changing agricultural practices and extensive pesticide use, which eliminates insect life, are thought to be keeping its numbers low.

MANAGEMENT PROGRAMS: Before any management programs can be initiated, surveys need to be conducted to determine where and how many upland sandpipers are currently breeding in Pennsylvania. When possible, grasslands found to be used by upland sandpipers should be managed to avoid disturbance during the nesting season. Mowing after July 15 ensures that young sandpipers—and other grassland birds—will not be harmed.



West Virginia Water Shrew

Sorex palustris punctulatus



Roger W. Barbour

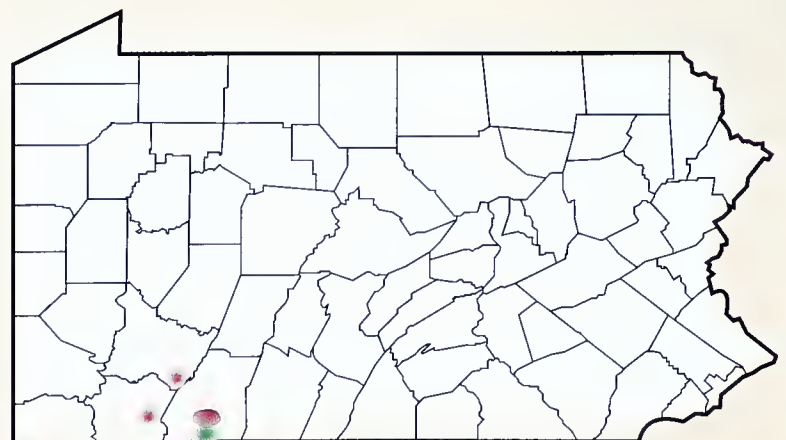
IDENTIFYING CHARACTERISTICS: This semi-aquatic shrew is nearly six inches long, including a $2\frac{3}{4}$ -inch tail. It has a dark blackish upper body and tail, and light grayish underparts. The large hind feet are fringed with stiff hairs.

BIOLOGY-NATURAL HISTORY: The West Virginia water shrew is confined to the Appalachian-Allegheny mountain chain, from the Georgia-Tennessee-North Carolina border north to southwestern Pennsylvania. Little is known about this subspecies. Its diet probably consists of small, aquatic animals including insect larvae and snails. The breeding season of a close cousin—the northern water shrew—lasts from late March to August or September. It produces two or three litters of four to eight young.

PREFERRED HABITAT: Water shrews prefer the margins of remote mountain streams beneath overhanging banks and in rock crevices, usually at higher elevations. Look for them along rocky headwater brook trout streams bordered by hemlock, spruce and rhododendron.

REASONS FOR BEING THREATENED: Survey efforts have failed to produce more than a single specimen at most sites. It is guessed that acidification of many headwater streams in southwestern Pennsylvania, which has caused a loss of brook trout populations, has also seriously eroded the aquatic food base needed to sustain West Virginia water shrews.

MANAGEMENT PRACTICES: Surveys to find remnant populations need to be intensified. Likewise, the shrew's ecology and local distribution—if any remain—needs to be studied. Only after such research is underway can management recommendations to improve the status of this rare shrew be offered.



● = verified after 1980 ● = historical occurrences

Yellow-Bellied Flycatcher

Empidonax flaviventris

IDENTIFYING CHARACTERISTICS: Brownish olive above and yellowish below, this 5-inch long flycatcher has whitish eye rings and wing bars. It's the only flycatcher found in the state that has a bright yellow throat.

BIOLOGY-NATURAL HISTORY: Commonly found breeding in the spruce-fir forests of Canada, this flycatcher reaches the southern extreme of its breeding range in northern Pennsylvania. The species nests on the ground, preferably in beds of sphagnum moss where three to five white eggs, sparsely flecked with brown, hatch by late spring. This species feeds mainly on insects and spiders. It winters in Central and South America.

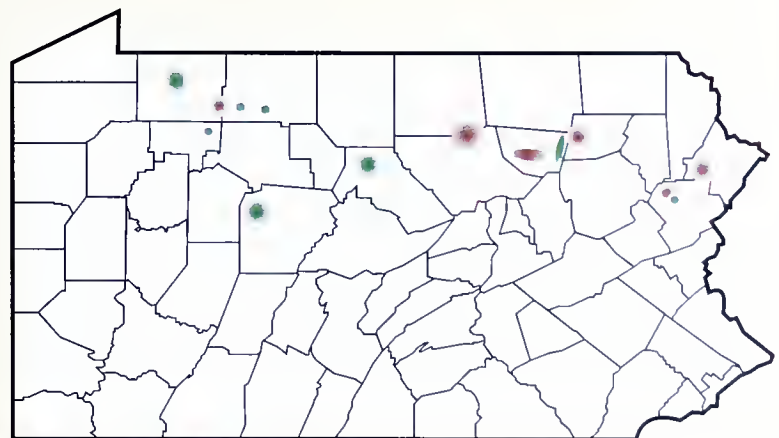
PREFERRED HABITAT: The yellow-bellied flycatcher is found in coniferous forests, alder thickets and high mountain bogs. In Pennsylvania, nests have been found in mossy, poorly drained areas (bogs and old beaver ponds) surrounded by extensive northern hardwood forests. Most nest sites are associated with standing water, sphagnum moss, conifers (spruce or hemlock), and the presence of high bush blueberries, alder, rhododendron or other shrubs.

REASONS FOR BEING THREATENED: Extensive development and peat mining within the Poconos has eliminated much of the habitat preferred by this species. Also, the impoundment of remote bogs in forested habitats has converted much of the habitat used by this species into small ponds.

MANAGEMENT PRACTICES: One of the state's rarest nesting species, this flycatcher can survive only if shrubby wetlands and conifer stands in extensive upland forests are preserved.



R. D. Collette, Cornell Lab of Ornithology



● = verified after 1980 ● = historical occurrences

Yellow-Crowned Night Heron

Nycticorax violaceus

IDENTIFYING CHARACTERISTICS: Adults are 22 to 28 inches in length, from bill tip to tail tip, gray with black head and a whitish cheek patch and crown. Eyes are red and legs yellowish. Immature is brown, finely spotted and streaked with white buff.

BIOLOGY-NATURAL HISTORY: Pennsylvania lies at the northern fringe of this species' breeding range, which is mainly in the southcentral United States. It nests singly or in small groups in the lower reaches of the Susquehanna. A typical clutch contains three or four eggs. Nesting starts as early as April. By mid-summer most young have fledged. Crayfish are a major part of this bird's diet.

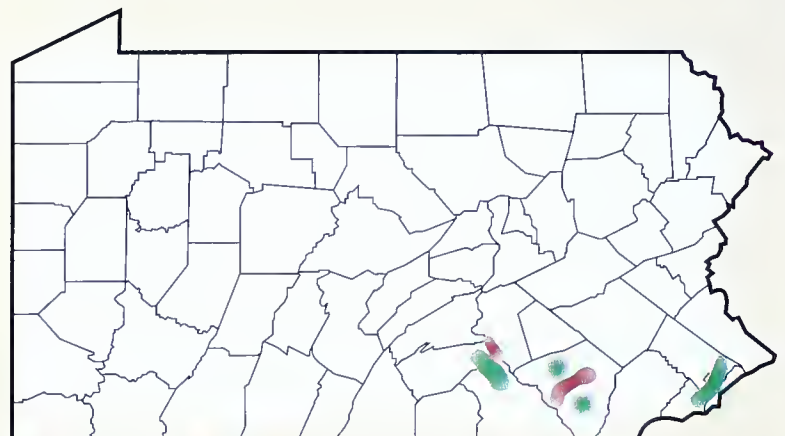
PREFERRED HABITAT: Feeds mainly along small shallow streams. Nests in brush or trees, usually sycamores, found on islands or along streams. Most nests found in recent years are along the Susquehanna River and its tributaries, in Lancaster County.

REASONS FOR BEING THREATENED: As a breeding bird, the combination of rarity and tendency to nest in small groups makes this species particularly vulnerable to local habitat disturbance or loss. The largest nesting colony known in Pennsylvania, representing more than half the state's known breeding population, is on a small river island. The integrity of this site and nearby shallow-water feeding areas are threatened by a proposed dam. Degradation of water quality, along with loss of the primary food source—crayfish—is an ever present threat.

MANAGEMENT PRACTICES: Known nest sites for this species are monitored and potential new sites need to be surveyed. Whenever possible, nesting habitats need to be protected.



A & E Morris VIREO



● = verified after 1980 ● = historical occurrences

Atlantic Sturgeon

Acipenser oxyrinchus



Mike Hendrix, U.S. Fish & Wildlife Service

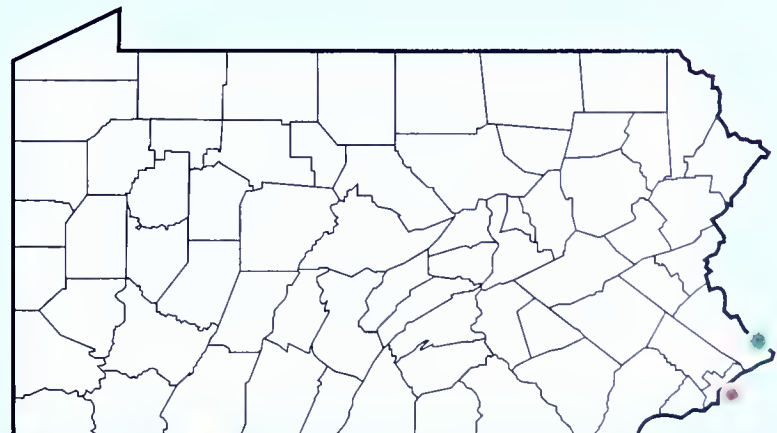
IDENTIFYING CHARACTERISTICS: This sturgeon is the largest Pennsylvania fish, attaining a maximum length of 12 feet. Unlike the lake and shortnose sturgeons, which have a single row of large bony plates anterior to the anal fin, the Atlantic sturgeon has two rows of smaller bony plates in that position. The spines on the plates along the top and middle of each side of the body, the front margin of the paired fins, and the lower tail fin lobe are white, contrasting with the dark gray to blue-black color of the upper body and fin bases.

BIOLOGY-NATURAL HISTORY: Males are first capable of breeding at about 22 to 24 years of age, when they are about five feet long; females when they're about 27 or 28 and about six feet long. While spending most of their time in salt water, these sturgeons must enter fresh water to spawn. They have been observed gathered in the middle Delaware River in the spring, in water 35 to 40 feet deep. The female broadcasts her light to dark brown eggs over a wide area of hard, clay bottom, where they become sticky and attach to overlying stones and various plants. Hatching takes place within one to two weeks, and the young then feed and grow for perhaps four years before moving into salt water. Both adults and young feed heavily upon bottom-dwelling invertebrates of various kinds, but adults take no food during the spawning period.

PREFERRED HABITAT: The Atlantic sturgeon breeds in the upper reaches of the Delaware River. Adults return to the Atlantic Ocean following spawning; the young remain in fresh water for about four years and then move to ocean waters to mature.

REASONS FOR BEING THREATENED: Although the larger population of this species ranges along the Atlantic coastal waters from Labrador to the Florida gulf waters, only a small portion of that population inhabits our eastern and southeastern border streams during certain times of the year. These fish are vulnerable to incidental taking and are subject to some of the same problems confronting shortnose sturgeon.

MANAGEMENT PRACTICES: Watershed management practices aimed at the restoration, maintenance and enhancement of the physical and chemical environment required by this species are essential for its future existence here.



● = verified after 1980 ● = historical occurrences

Bluebreast Darter

Etheostoma camurum



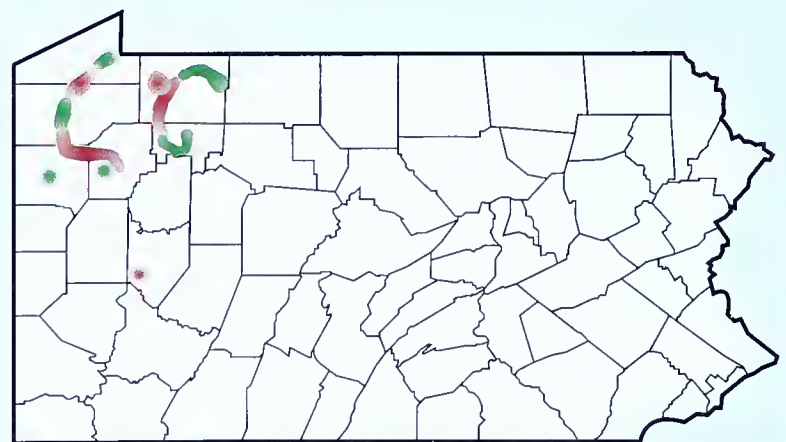
IDENTIFYING CHARACTERISTICS: This snub-nose species reaches three inches in length. The gill cover has a central patch of often-embedded scales, and up to a third of the tail fin is covered with very small scales. The breast is typically dark blue to blue-green, the body pale dusky blue to blue-green with diffuse dark vertical bars and horizontal dark stripes on the hind portion, with crimson (males) to brownish (females) spots scattered over the sides. The largely dusky (males) to clear or spotted (females) fins are edged with light color, and in breeding season males become tinged with orange-red. The belly of breeding males is also orange-red.

BIOLOGY-NATURAL HISTORY: During its spring to early summer spawning period, the bluebreast darter apparently migrates long distances from the lower reaches of its stream habitat to the upstream reaches. Males select sites around large stones in swift riffles where they establish small, vaguely-defined territories. Females approach these sites from downstream. After attracting the attention of a male by swimming in short, quick movements, each female apparently leads a male in a chase. She then returns to his nest-stone and burrows into the fine gravel there, where the pair spawns. The female may deposit up to 100 eggs during each of several similar episodes with the same male, but may also repeat the procedure with other males. Eggs deposited by females held in a tank hatched within seven to 10 days. Food items for this species consist mostly of the very small larvae of aquatic insects inhabiting the riffles. Most females are ready to breed at the end of their first year.

PREFERRED HABITAT: This species requires clean, medium to large size rivers with swift flow and high bottom velocities, and a bottom of large rocks, rubble and coarse to fine gravel.

REASONS FOR BEING THREATENED: The bluebreast darter is locally and discontinuously distributed in Pennsylvania, Illinois, Ohio, West Virginia, Virginia, Tennessee and North Carolina. It's known in Pennsylvania only from the upper Allegheny River and two tributaries, Little Brokenstraw Creek and French Creek. There is an historical record from the Beaver River headwaters. While maintaining its known populations, the species is, nonetheless, vulnerable to detrimental habitat changes.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. As the quality of this habitat goes, so go the species dependent upon it. This darter and other animals associated with it in this habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Bog Turtle

Clemmys muhlenbergii



Clark Shaffer

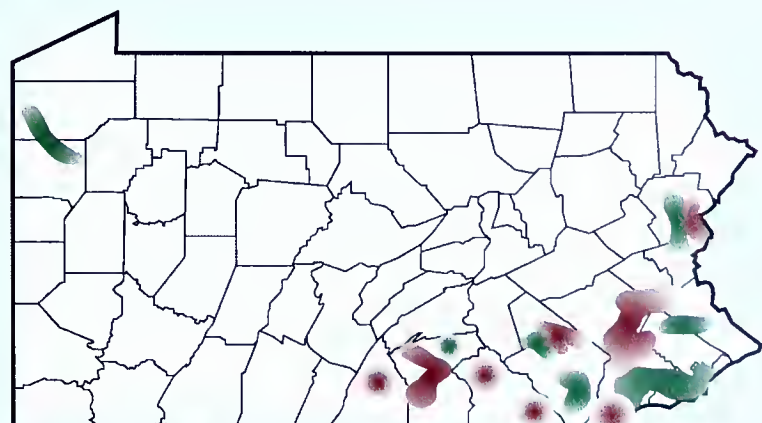
IDENTIFYING CHARACTERISTICS: The bog turtle is among the smallest North American turtles. Adults are four to 4½ inches long. The upper shell is dark brown with yellow to orange markings and covered with ridged plates that are eventually worn smooth; the lower shell is dark brown or black, sometimes with scattered light markings. A large red-orange or yellow blotch behind each eye is the most conspicuous color feature of an otherwise brown body lightly marked with orange or yellow.

BIOLOGY-NATURAL HISTORY: Mating takes place in May and early June. Each female then digs a nest and lays a clutch of three to five eggs during June or July. Eggs receive no parental care, and hatchlings leave the nest several months later. Adults and young feed on a variety of plant and animal food, such as berries, insects and even carrion. They do not wander far from hibernating sites in spring seepage, which they leave in April or May and return to in late summer. Summer hibernation (aestivation) may occur during July and August; individuals are otherwise encountered basking on sedge tussocks or moving slowly about in spring runs under concealing vegetation. When danger threatens, individuals burrow rapidly into the mucky bottom of spring runs.

PREFERRED HABITAT: Bog turtles live in relatively open portions of sphagnum bogs, swamps or marshy meadows with slow moving, spring fed streams or spring runs with soft bottoms.

REASONS FOR BEING ENDANGERED: The primary reason for the bog turtle's status is the draining or other destruction of its habitat. Because bog turtles have always been considered the rarest of North American turtles, they are highly valued by turtle fanciers in this country, and possibly twice as much overseas. Many, therefore, have been illegally removed for commercial purposes. Since their habitats are widely separated, other turtles are not likely to move in and replace those removed.

MANAGEMENT PRACTICES: Informal agreements concerning the continued occurrence of the turtles have been made with owners of private property where bog turtles exist. Field surveys have determined the status of historical and new sites. Also, permit review and commentary concerning public use projects where bog turtle habitat is involved is ongoing.



● = verified after 1980 ● = historical occurrences

Burbot

Lota lota



John G. Shedd Aquarium

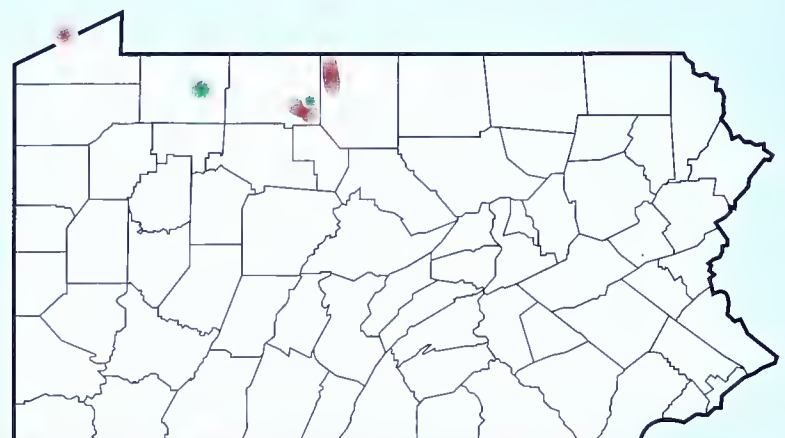
IDENTIFYING CHARACTERISTICS: The burbot is our only freshwater representative of the primarily ocean-dwelling species of the Codfish Family. Though reaching a length of 46 inches, it averages half that. The hindmost dorsal fin and the anal fin are quite long and nearly equal in length. Both of these fins are separated from the rounded tail fin. A pair of pelvic fins is situated in the throat region in front of the large pectoral fins. A barbel-like tube extends from each nostril and a single barbel extends from the tip of the lower jaw.

BIOLOGY-NATURAL HISTORY: The burbot is one of only a few Pennsylvania freshwater fishes to spawn in midwinter. Spawning may take place at night, over a sand-gravel bottom in the shallow portions of lakes or tributary streams under a covering of ice. Up to a dozen individuals may be involved in a constantly moving group of spawners that broadcast fertilized eggs over a wide area of the bottom. Eggs drift along the bottom and hatch within 30 days. The young grow rapidly for their first four years, feeding mostly at night on a variety of invertebrates. They spend most of this time in lake shallows or stream channels. Adults more than 20 inches feed almost entirely on other fishes during the summer, when in deeper water, and on invertebrates in the winter.

PREFERRED HABITAT: Burbot prefer deep, cold waters of lakes and rivers. During late winter and early spring, after spawning, they often migrate from lakes to tributary rivers. The only Pennsylvania populations occur in Lake Erie and the Allegheny River headwaters.

REASONS FOR BEING THREATENED: The Allegheny River population represents a relict distribution. This small population has persisted, but is more vulnerable to some of the environmental changes (pollution, competition with other species, overfishing) causing a reduction of Great Lakes populations in the past.

MANAGEMENT PRACTICES: Watershed management practices that maintain or enhance the physical and chemical conditions required by this species are necessary to assure its continued existence as a part of our fauna.



● = verified after 1980 ● = historical occurrences

Channel Darter

Percina copelandi



Rob Crosswell

IDENTIFYING CHARACTERISTICS: This delicate, tan, brown-spotted species seldom exceeds 2 ½ inches. The fleshy connection (frenum) linking the middle of the snout with the frontmost paired bones of the upper jaw is very weakly developed or lacking in this species. Males have a row of large, spined scales along the hindmost midline portion of the belly. The body and fins of males darken greatly during breeding, and a blue-green sheen develops over the sides of the body.

BIOLOGY NATURAL HISTORY: Spawning takes place in spring to mid-summer. Males select and establish small territories downstream from large stones scattered over a clean sand-small gravel bottom. Females move into these territories, burrow into the gravel behind each stone, and spawn there with various males. Small numbers of eggs are deposited and fertilized with each spawning, until up to 400 eggs are laid. Small aquatic insect larvae, as well as algae and organic detritus, are their food items.

PREFERRED HABITAT: The channel darter inhabits large clean streams and rivers with moderate current and bottoms consisting of large rocks, fine gravel and sand. Riffle areas are utilized during spawning and summer feeding, and deeper, quiet backwaters during the winter.

REASONS FOR BEING THREATENED: This species is discontinuously distributed across the Deep South and Midwest, and in a separate, larger area of the Ohio River, Great Lakes, and St. Lawrence drainages. In Pennsylvania, it is known from Lake Erie and larger tributaries, where its populations have declined, and the upper part of the Allegheny River drainage. It is seldom abundant at any locality.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. This darter and other animals associated with it in this habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Coastal Plain Leopard Frog

Rana utricularia



Robert T. Zis, Jr., North Carolina Wildlife Resources Commission

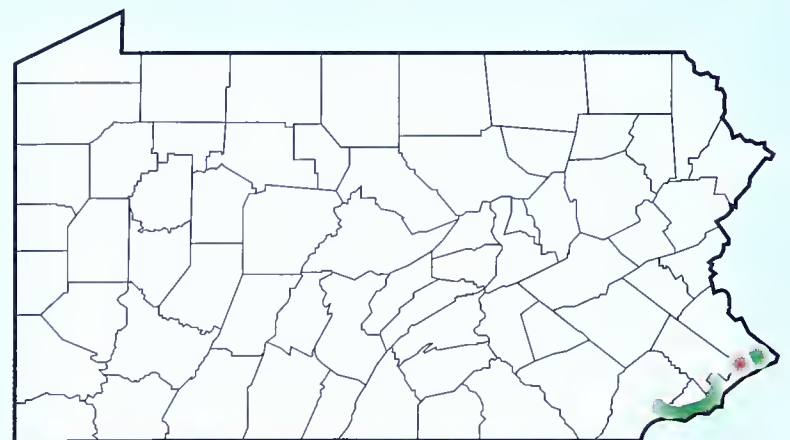
IDENTIFYING CHARACTERISTICS:

This 2- to 3½-inch frog is similar to the common northern leopard frog but differs as follows: often a light spot in center of eardrum; longer, more pointed snout; fewer spots on sides; spots on back more elongate and not rimmed with lighter color; vocal sacs of male are visible externally; and the top of the snout lacks a dark spot.

BIOLOGY-NATURAL HISTORY: Breeding takes place in early spring, when males may be heard calling between midnight and daylight. The call is a short, guttural trill (pulse rate 13 per second or less, versus 20 per second for the northern leopard frog) followed by two or three clucking sounds. Eggs are laid in flattened clusters attached to submerged plant stems or sticks in shallow water. Eggs hatch within several weeks, and the tadpoles begin transforming to the adult stage, when less than an inch, about three months later. As transformation approaches, the tadpoles' tails become conspicuously blotched with black. Adults may wander from the breeding sites during the summer.

REASONS FOR BEING ENDANGERED: The coastal plain leopard frog is endangered because of the loss of its breeding sites to industrial activity.

MANAGEMENT PRACTICES: The Fish and Boat Commission reviews projects in which possible threats to the habitat of this small frog is concerned. The coastal plain habitats required by this species in the north are found only in a limited portion of the state, and potential threats to this habitat are being monitored.



● = verified after 1980 ● = historical occurrences

Eastern Massasauga

Sistrurus catenatus catenatus



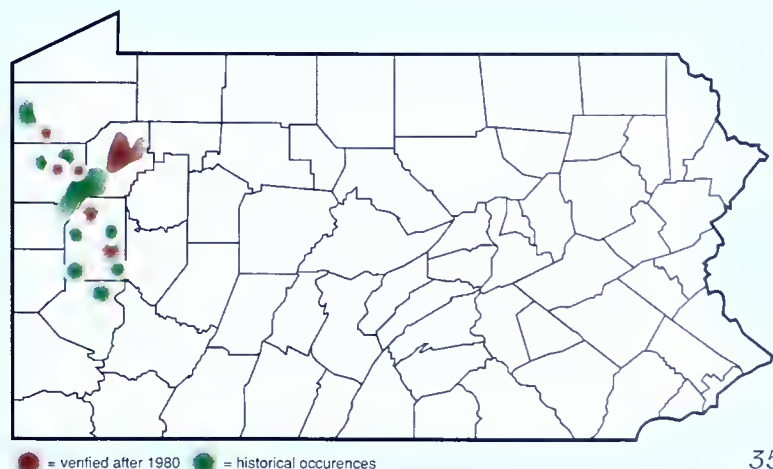
IDENTIFYING CHARACTERISTICS: The massasauga is the smallest of Pennsylvania's three venomous snakes. Most individuals are 20 to 30 inches in length (record: 39½ inches). Unlike the larger, black-tailed timber rattlesnake, the massasauga's tail is ringed with dark brown or black, and the top of its head is covered with nine large scales (plates) like our nonvenomous snakes. The belly is black, irregularly marked with pale yellow or white. The tail is tipped with yellow in the young and bears a small, but well-developed rattle.

BIOLOGY-NATURAL HISTORY: Massasaugas hibernate in water-saturated sites, six to 24 inches underground, although some remain active through the winter, raising their heads above the water in which they may lie. Crayfish burrows may be used to gain access to these winter quarters, from which the snakes emerge in mid-April. After feeding on frogs and crayfish and sunning for about a month, they move to higher, drier old fields or meadows nearby to feed on rodents and insects. Females with developing young may bask together in drier areas until birth of their young in August or early September. Females reach breeding age at two years and give birth to an average of six or seven young every other year. Hibernation begins in mid-October; young may enter hibernation later than adults.

PREFERRED HABITAT: Massasaugas require relatively open old field and wet meadow habitat with low lying areas of saturated soil and higher, drier ground nearby. In Pennsylvania, this combination of wet and dry habitat is found only in relict prairie terrain of certain western counties.

REASON FOR BEING ENDANGERED: Never common in Pennsylvania, massasaugas now may be found in only half their historic sites, due to dam building, highway construction, urbanization, forest succession, surface mining and agricultural activity.

MANAGEMENT PRACTICES: In cooperation with other agencies, the Fish and Boat Commission reviews projects potentially damaging to massasauga habitat. On-site consultation with mining company personnel has resulted in mutually-acceptable modifications of proposed plans, thus taking the massasauga's continued existence into account. Since massasaugas are uncommon, they are valued by collectors, but are fully protected by regulations.



Eastern Mud Salamander

Pseudotriton montanus montanus



Scott Fries, Nature's Images

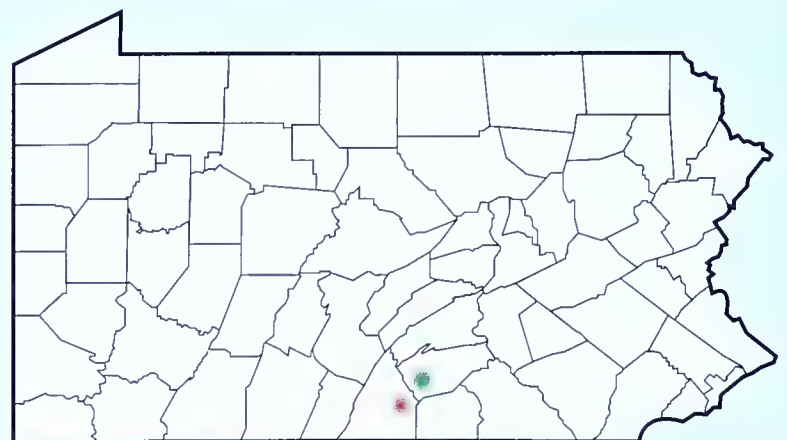
IDENTIFYING CHARACTERISTICS: The eastern mud salamander ranges from 3½ to six inches. It most closely resembles the northern red salamander, but its eye color is brown, not yellow, and the dark spots are fewer in number and more circular. The back color is a darker red-brown that does not blend into the lighter red of the sides and belly.

BIOLOGY-NATURAL HISTORY: Nothing has been recorded concerning the biology of this species in Pennsylvania. In Virginia and the Carolinas, eastern mud salamanders engage in courtship in the fall and breed in early winter. Females deposit up to 200 eggs every other year. Transformation from larva to adult normally occurs in 17 months, but some take an additional year. Males mature in three years, females in four.

PREFERRED HABITAT: Eastern mud salamanders may be found in the fine, black muck under stones and logs, or burrowing in spring seepages, spring-fed brooks or swamps, along the coastal plain or piedmont regions from southern New Jersey to Georgia.

REASONS FOR BEING ENDANGERED: The first specimen of the eastern mud salamander to be described was taken from South Mountain near Carlisle, Cumberland County. Despite repeated searches, additional specimens from this locality have not been found, but the animal has been found at a nearby site. Although occurring at higher elevations at the southern edge of its range, its occurrence in mountainous country in the north is unusual.

MANAGEMENT PRACTICES: Additional searches should be made for this species in Pennsylvania.



● = verified after 1980 ● = historical occurrences

Eastern Sand Darter

Ammocrypta pellucida



Kathy Crum

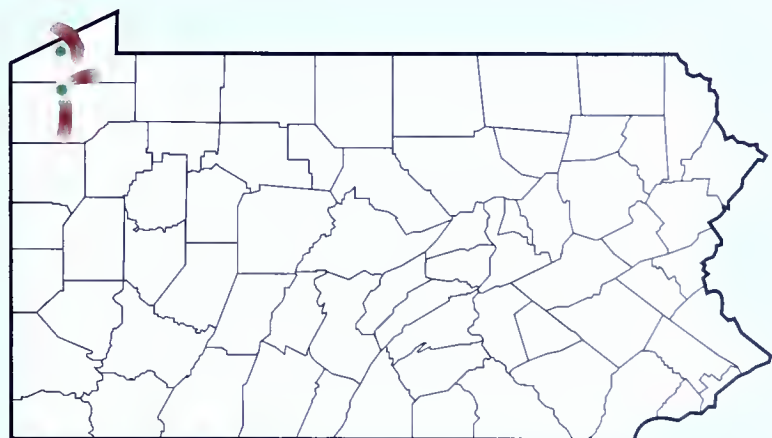
IDENTIFYING CHARACTERISTICS: The sand darter is a small member of the Perch Family, averaging 2½ inches in length. Adults are pale yellow above and silvery below, with a row of green spots along the top and sides. The flesh has a somewhat transparent quality.

BIOLOGY-NATURAL HISTORY: Sand darters spawn from early June until late July in the Ohio River basin, somewhat later in the Great Lakes. The young are white or silvery and, like the adults, feed primarily on small insect larvae or other invertebrates. Sand darters conceal themselves in sand, with only their eyes and snout protruding, and dart out to capture prey.

PREFERRED HABITAT: Sand darters are found in streams ranging in size from small creeks to large rivers, with a bottom of sand, silt, mud or gravel, and in the wave-protected sandy beaches of Lake Erie. Sandy raceways of large rivers are preferred.

REASONS FOR BEING THREATENED: Agricultural and industrial pollution, especially siltation, have rendered many areas unsuitable for sand darters. Dam construction and dredging have also eliminated suitable habitat for them.

MANAGEMENT PRACTICES: As a threatened species, sand darters are protected by regulations against taking, selling, importation or exportation. One of the streams where it exists is designated as an exceptional quality water by the Department of Environmental Protection.



● = verified after 1980 ● = historical occurrences

Gilt Darter

Percina evides



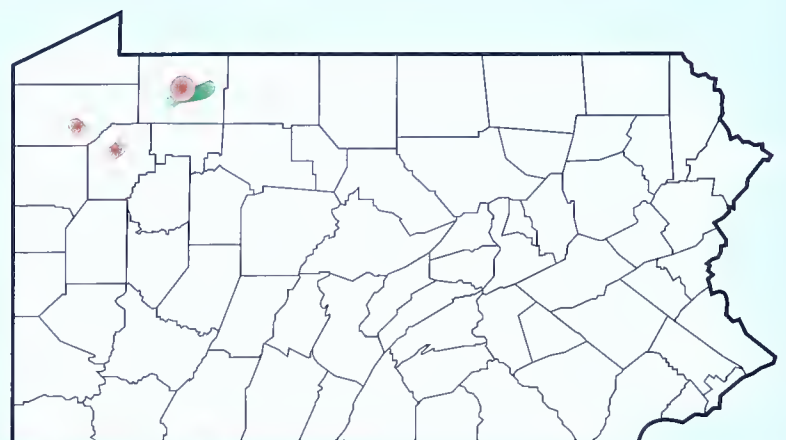
IDENTIFYING CHARACTERISTICS: The gilt darter attains a maximum length of 3½ inches. The robust body is dark olive above, shading to lighter yellow-green on the sides and belly. Seven to nine dark blotches above join to a series of similar blotches along each side to form vertical bands. A bar of dark color extends downward from each eye. Breeding males are adorned with bright orange-red to yellow and blue-green markings on the head, sides, lower body and first dorsal fin. The midline of the belly in males bears a row of large, spiny scales.

BIOLOGY-NATURAL HISTORY: Little is known about this species. Spawning apparently takes place in deep riffles during the spring. Brightly colored males have been found well into the summer months within its Southern and Midwestern range.

PREFERRED HABITAT: Gilt darters require clean rivers, whether small or large, with moderate to fast current, flowing over gravel-rubble bottoms. It prefers the middle and lower parts of riffles and clean pools.

REASONS FOR BEING THREATENED: The species is known in Pennsylvania only from the upper Allegheny River, where it has persisted for many years. This locality is the smallest of four other disconnected areas in the upper Mississippi River basin, the Ozark region, Indiana, and major southern tributaries of the Ohio River. It seems to be declining throughout its range. Though associated with a number of other darter species, relatively few individuals of the gilt darter are encountered.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. This darter and other animals associated with it in this habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Gravel Chub

Erimystax x-punctatus



AS Shilin

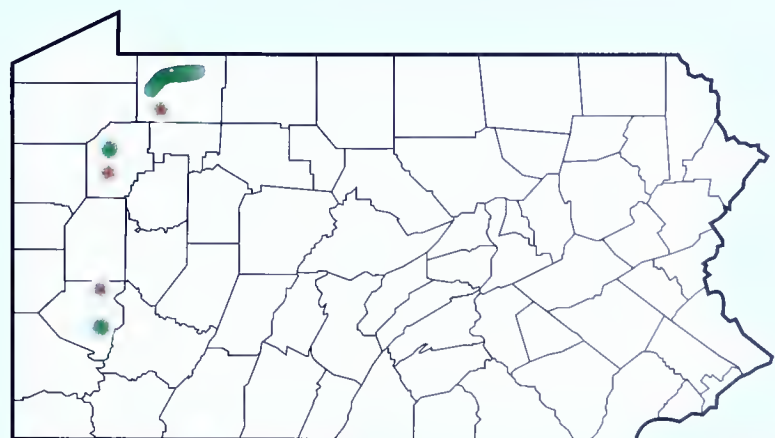
IDENTIFYING CHARACTERISTICS: The gravel chub reaches just over three inches. The head is elongated with moderately large eyes, and a rounded snout that overhangs the mouth, the corners of which bear a small, but noticeable barbel. The silvery sides of the body are marked irregularly with darker X- or Y-shaped markings. The small anal fin has seven rays; the dorsal and pelvic fins each have eight.

BIOLOGY-NATURAL HISTORY: Aside from observations concerning feeding competition with a similar *Erimystax* species, the biology of this species is unknown.

PREFERRED HABITAT: Moderately deep portions of large, clear creeks and rivers, or shallow riffles flowing over a sand-gravel-rock bottom, are preferred.

REASONS FOR BEING ENDANGERED: The gravel chub is known in Pennsylvania only from the upper Allegheny River and the lower end of French Creek, in glaciated terrain, where dams, attendant siltation and pollution have been less prevalent. It is an apparent hold-over from an earlier time when its required habitat was more continuous. It has today become very restricted in occurrence throughout its range.

MANAGEMENT PRACTICES: Watershed management practices that prevent the physical and chemical deterioration of the once more widespread postglacial conditions required by this species are necessary to prevent its further demise. The mining and processing of glacial gravel within the watersheds where this species occurs must be carefully regulated.



● = verified after 1980 ● = historical occurrences

Green Salamander

Aneides aeneus



Robert T. Zippel, Nature's Images

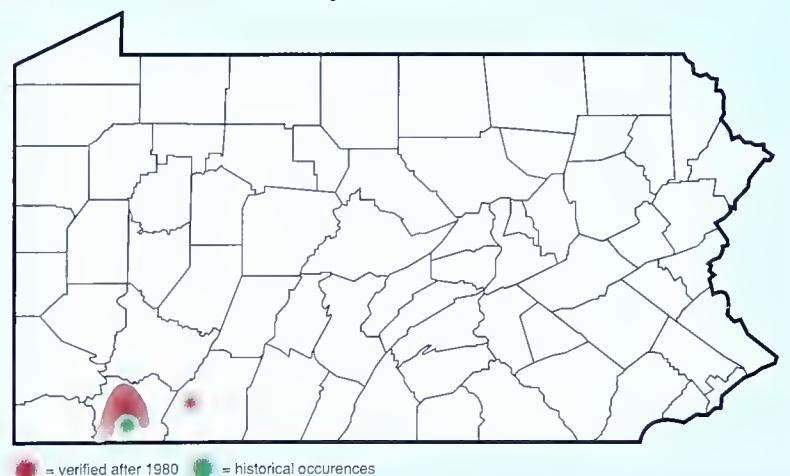
IDENTIFYING CHARACTERISTICS: Green salamanders are of average size (three to five inches) but no other Pennsylvania salamander has green lichen-like markings on a dark brown to blackish body. The toes are somewhat expanded and square-tipped; the body is flattened and the jaw muscles (of males particularly) are large and strong.

BIOLOGY-NATURAL HISTORY: Courtship and breeding may be conducted anytime from May to September. Males use the strong jaws and projecting upper jaw teeth to bite and shove one another during territorial struggles. Following mating, females deposit an average of 17 eggs on the upper surfaces of sandstone rock crevices, and then remain with the eggs to defend them against intruders. The young (less than an inch) hatch 84 to 91 days later and soon seek mossy crevices. Both young and adults feed on various invertebrates inhabiting the rock crevices. Winter is spent deep within cracks and crevices below the frost line, where a number of individuals may hibernate together. Females mating in late summer carry fertilized eggs through the winter and deposit them the following spring.

PREFERRED HABITAT: Green salamanders have been found in Pennsylvania only in certain crevices in sandstone rock cliffs or outcroppings of the Pottsville formation. These rocks are located on moist hardwood forest slopes or ravines, often near streams.

REASONS FOR BEING THREATENED: Green salamanders historically occurred at one site in southern Fayette County, the northernmost known locality in their limited Appalachian range. Sand mining at this site may prove a threat to this species. Less than 12 additional sites have now been found as a result of further search.

MANAGEMENT PRACTICES: As new sites are discovered, monitoring of land-use becomes important. Removal of the forest cover at these sites eliminates the humidity levels the salamanders require, and is a greater threat to the colonies than the destruction or deterioration of rock outcroppings. Rock climbing activity at colony sites may prove detrimental if it is intensive.



Kirtland's Snake

Clonophis kirtlandii



Pennsylvania Fish & Boat Commission

IDENTIFYING CHARACTERISTICS:

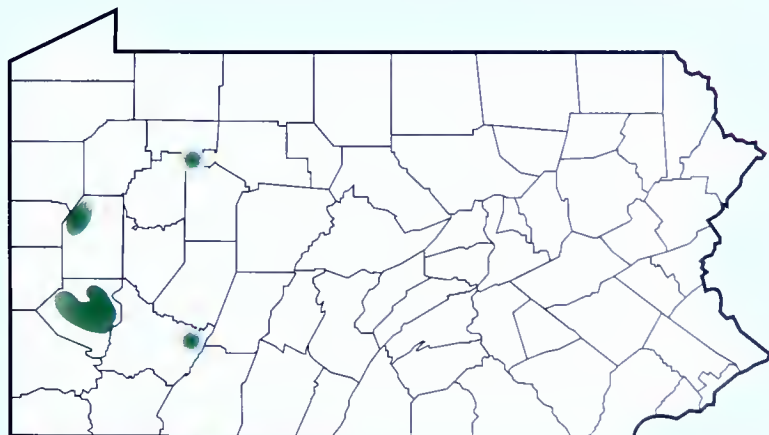
Kirtland's snake grows to just over two feet. The keeled upper-body scales are gray to reddish-brown, with two rows of small, diffuse dark blotches along the midline, and a row of larger dark blotches alongside these. The head is darker with a whitish chin, throat and some scales around the mouth. The belly is red with a row of black spots along each margin.

BIOLOGY-NATURAL HISTORY: This species emerges from hibernation in late March or April. Mating pairs have been seen in May. The four to 6½-inch young are born live, from late July to late September; litters range from four to 22. Females are ready to breed when they have reached about half their eventual length, while males may breed when slightly smaller than that. Earthworms and slugs are known food items. Logs, rocks and leaf piles serve as daytime retreats during the summer; crayfish burrows may be used in summer as well and also as hibernating sites from late October until late March.

PREFERRED HABITAT: Kirtland's snake prefers open damp habitats, such as marsh edges, wet fields and pastures, and along creeks, canals, sluggish ponds and ditches. Prominent occurrences of this species are recorded from such habitat types in and around large cities.

REASONS FOR BEING ENDANGERED: Kirtland's snake continues to be a very elusive species, with most Pennsylvania records from within, or around the greater Pittsburgh area. Other, more localized records from Jefferson and Westmoreland counties suggest a wider distribution in the western part of the state.

MANAGEMENT PRACTICES: Additional, concentrated searches in likely habitats is needed. Also, wetland habitats must be protected against encroachment or destruction.



● = verified after 1980 ● = historical occurrences

Lake Sturgeon

Acipenser fulvescens



John G. Shedd Aquarium

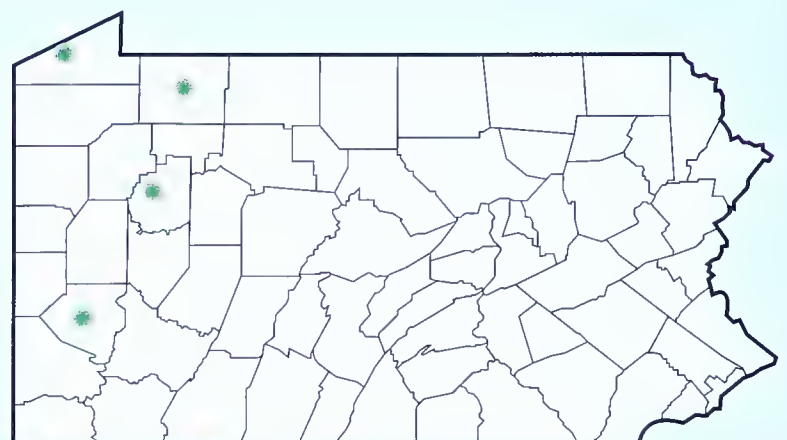
IDENTIFYING CHARACTERISTICS: The lake sturgeon is the second largest of Pennsylvania's sturgeons, reaching seven feet in length. Adults are olive-brown to gray on the back and sides and white below, with dark brown to gray fins. The rows of bony scales on the top and sides are the same color as the body.

BIOLOGY-NATURAL HISTORY: Lake sturgeon spawn for the first time when they're 15 to 20 years of age. Spawning occurs in the swifter portions of streams, or over rocky shorelines of lakes, from early May to late June. The black eggs stick to rocks and logs and hatch within 10 days. The tiny young are nourished by a yolk sac for another 10 to 20 days, then—like adults—they feed on small bottom dwelling animals. Males spawn at 2- to 3-year intervals, females every four to six years. Lake Sturgeon may reach 80 years of age.

PREFERRED HABITAT: Lake sturgeon live in larger rivers and lakes. In Pennsylvania, they are presently known to occur only in Lake Erie.

REASONS FOR BEING ENDANGERED: The pollution of large western Pennsylvania rivers, and the building of locks and dams which prevented upstream movement and spawning, eliminated lake sturgeon from these waters. Over fishing seriously reduced the Lake Erie populations. Slow to mature and reproduce, lake sturgeon are very vulnerable to environmental changes.

MANAGEMENT PRACTICES: Legal harvest of lake sturgeon is prohibited. Pollution abatement is proceeding in portions of Lake Erie and in the large rivers, but dams still block upstream movement of lake sturgeon.



● = verified after 1980 ● = historical occurrences

Longhead Darter

Percina macrocephala



Fish & Wildlife

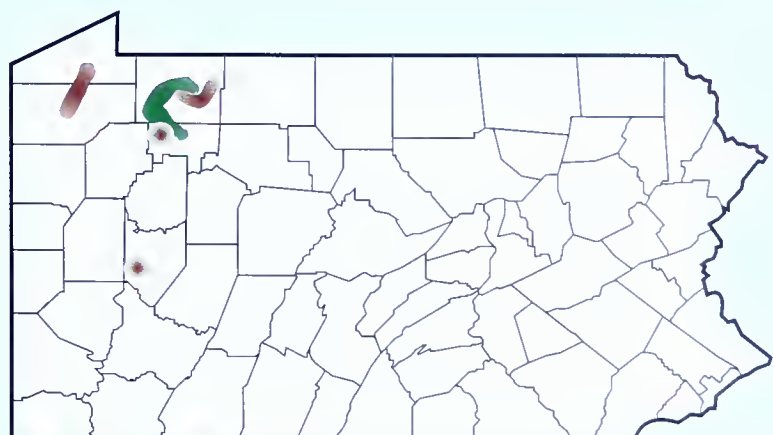
IDENTIFYING CHARACTERISTICS: This is one of our larger darters, reaching a maximum length of about four inches. The head is elongated with a sharp, cone-shaped snout. The upper body is brown marked with black; the lower body is white. A series of large black blotches are joined along both sides of the lateral line. A separate round black spot is situated at the base of the tail fin that is diffusely extended downward. A black “tear” mark below each eye continues backward onto the lower front corner of the cheek. Breeding males are darkly colored.

BIOLOGY-NATURAL HISTORY: No spawning observations are on record, largely because this species is encountered only sporadically and in small numbers throughout its range. Adults feed on small crayfish and larger insect larvae.

PREFERRED HABITAT: The longhead darter prefers clean, fast, rocky riffles, or clear pools. Medium-sized, unpolluted streams with a moderate current are required.

REASONS FOR BEING ENDANGERED: This species is known in Pennsylvania only from scattered sites in the Allegheny River and French Creek headwaters. It is only sporadically encountered throughout its distribution along the western side of the Appalachians, from southwestern New York to North Carolina and Tennessee.

MANAGEMENT PRACTICES: The sporadic encounters of small numbers of the longhead darter indicate its vulnerability to environmental degradation. Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. This darter and other animals associated with it in this habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Longnose Sucker

Catostomus catostomus



Rob Criswell

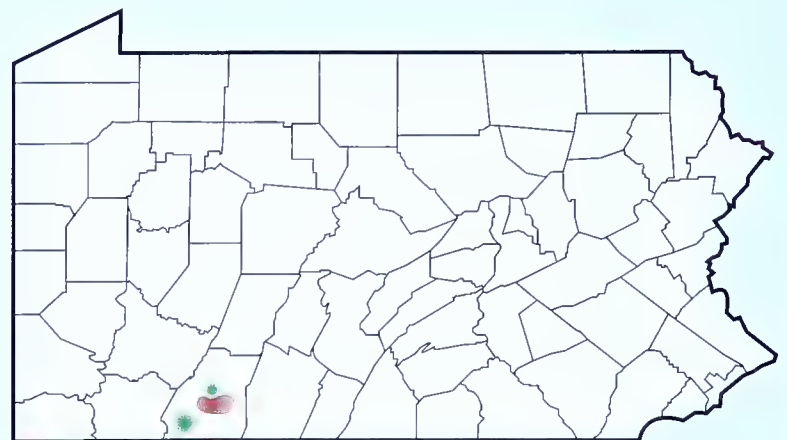
IDENTIFYING CHARACTERISTICS: This sucker resembles the common white sucker, but is generally darker, smaller (12 to 14 inches) and has a noticeably long snout. The number of scales along the lateral line of this species is 90 to 117, while the white sucker has less than 85. Spawning adults, particularly males, develop a bright pink to reddish band along the middle of each side of the body.

BIOLOGY-NATURAL HISTORY: Spawning takes place in early spring, over a 1- to 2-week period during the early to mid-morning hours. Males wait over gravelly areas in mid-stream for individual females, which return to the sides of the stream following repeated, short spawning episodes. Small batches of eggs attach to bottom material and hatch within several weeks. The fry remain within the gravel for a time, and then disperse throughout the stream. Both adults and young feed on a variety of invertebrates taken from the stream bottom and on algal growth.

PREFERRED HABITAT: While this species inhabits lakes and their tributary streams throughout its wide northern North American and Northeast Asian range, it is found in Pennsylvania only in three Youghiogheny River headwater streams.

REASONS FOR BEING ENDANGERED: The small Pennsylvania populations of the longnose sucker are separated by hundreds of miles from the closest main part of this species' range. These relict populations are vulnerable to extirpation. Geographically separate, or disjunct, populations such as these have much to tell us about the processes that created present stream drainage patterns.

MANAGEMENT PROGRAMS: Prevention of the physical and chemical deterioration of the watershed wherein this species occurs requires continual monitoring.



● = verified after 1980 ● = historical occurrences

Mountain Brook Lamprey

Ichthyomyzon greeleyi



Greg Meszoros

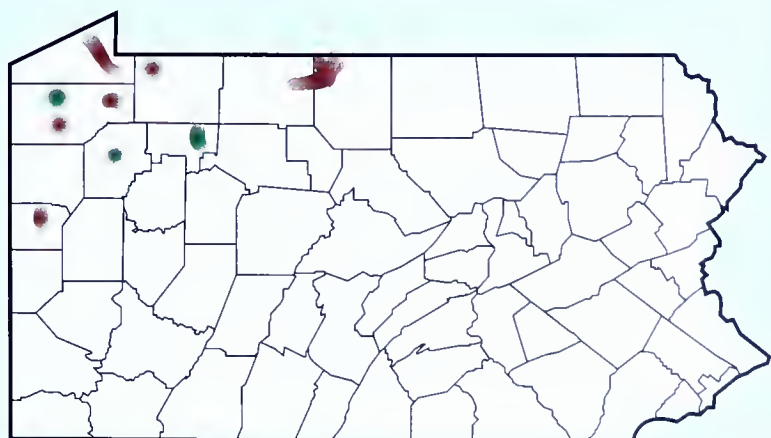
IDENTIFYING CHARACTERISTICS: This fish is a non-parasitic lamprey similar to the Ohio lamprey and it typically reaches a smaller maximum length (to 10 inches). The sucking mouth disc bears 10 large teeth with two sharp cusps situated around the top and sides of the mouth opening and a single row of smaller, single-pointed teeth beneath the mouth opening. Regular rows of generally smaller single-pointed teeth occupy the remainder of the disc. The sucking disc is narrower than the body.

BIOLOGY-NATURAL HISTORY: This species' spawning period partly coincides with the Ohio lamprey's. Both species have been observed using the same spawning depressions at the same time. Adults die soon after spawning; the ammocoetes, which cannot be distinguished structurally from Ohio lamprey ammocoetes, construct U-shaped burrows in which they remain until sexually mature. Food items consist of a variety of very small plants and animals carried by the current. Upon attainment of sexual maturity, the digestive system degenerates and teeth develop within the hooded mouth.

PREFERRED HABITAT: The mountain brook lamprey inhabits some of the same waters inhabited by the Ohio lamprey, but it is usually found farther upstream.

REASONS FOR BEING THREATENED: The status of this species parallels that of the Ohio lamprey. Deterioration or destruction of the physical and chemical makeup have reduced its preferred habitat.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. As the quality of this habitat goes, so go the species dependent upon it.



● = verified after 1980 ● = historical occurrences

Mountain Madtom

Noturus eleutherus



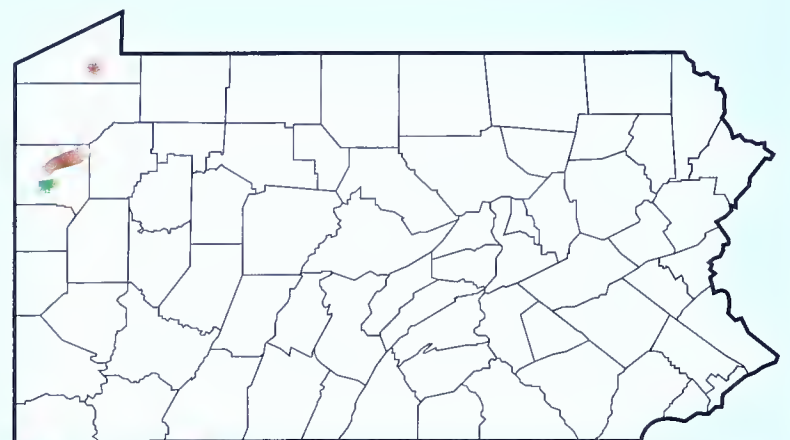
IDENTIFYING CHARACTERISTICS: This small catfish reaches a maximum size of about three inches, but most individuals range from about one to 2½ inches in length. The adipose fin is connected with the tail fin, but appears to be separate. The frontmost patch of teeth on the roof of the mouth lacks backward extensions. Although the pectoral fin spines are curved and strongly toothed along the rear margin, as in the northern madtom, the front margin is weakly toothed (strongly toothed in the northern madtom).

BIOLOGY-NATURAL HISTORY: Aside from published observations concerning its growth rate in Ohio, there is no life history information available.

PREFERRED HABITAT: The mountain madtom requires clean, moderate- to swift-flowing large streams or rivers with a bottom of large stones, rubble, gravel and sand. It is usually found in deep, fast riffles, sometimes in dense vegetation attached to the bottom material. It is apparently very sensitive to siltation and other pollutants.

REASONS FOR BEING THREATENED: In Pennsylvania, this species continues to exist only in French Creek in Mercer and Erie counties, but it has also been historically recorded from the Shenango River.

MANAGEMENT PRACTICES: Diligent watershed monitoring is necessary to safeguard against the deterioration of the upper Allegheny River system. As the quality of this river goes, so go many of the animals dependent upon it. The mountain madtom and other animals in this particular habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

New Jersey Chorus Frog

Pseudacris feriarum kalmi



Robert T. Zippin/Orti, Nature's Images

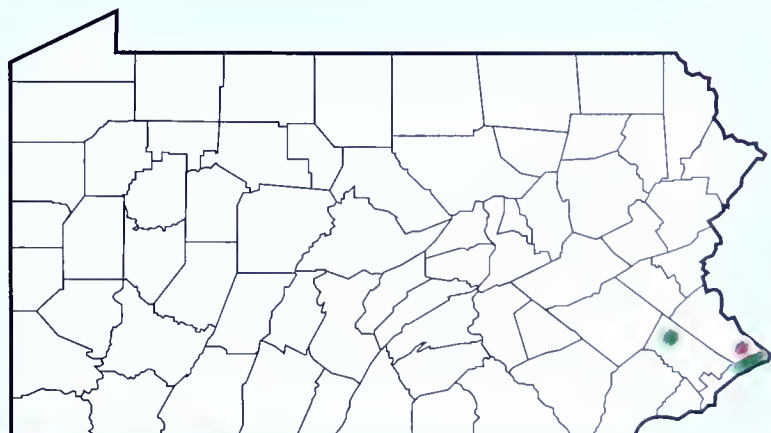
IDENTIFYING CHARACTERISTICS: This subspecies of the western chorus frog is similar in size ($\frac{3}{4}$ - $1\frac{1}{2}$ inches long), but is somewhat more robust. The outermost pair of the three dark stripes on the back start at the snout and continue backward through the eye and down each side. These may be variously broken. A prominent light line is present beneath each eye along the upper lip.

BIOLOGY-NATURAL HISTORY: New Jersey chorus frogs move to small, sometimes temporary, bodies of water to breed, anytime from February to June. Males may arrive at the ponds before females and call loudly from sedgy or grassy clumps in the open. The eggs are deposited irregularly in loose gelatinous masses on the stems of matted vegetation not far below the surface of the water. The 1- to $1\frac{1}{2}$ -inch tadpoles are blackish to olive above with a bronzy belly. They transform to the adult stage within two months. Adults leave the breeding pools following mating and egg laying, and are only occasionally encountered in wooded areas during the remainder of the year.

PREFERRED HABITAT: In Pennsylvania the New Jersey chorus frog breeds in small, relatively open bodies of water with a mixture of shrubby and herbaceous aquatic vegetation, or sometimes in the shallow backwater areas of larger bodies of water with similar vegetation.

REASONS FOR BEING ENDANGERED: The populations of the New Jersey chorus frog in Pennsylvania are small and threatened because of heavy industrial use of the areas they inhabit. Many of the small breeding ponds and forested areas they require have been filled in or cleared.

MANAGEMENT PRACTICES: The Fish and Boat Commission reviews projects in which possible threats to the habitat of this small frog is concerned. Also, the populations are monitored each spring.



Northern Brook Lamprey

*Ichthyomyzon
fossor*



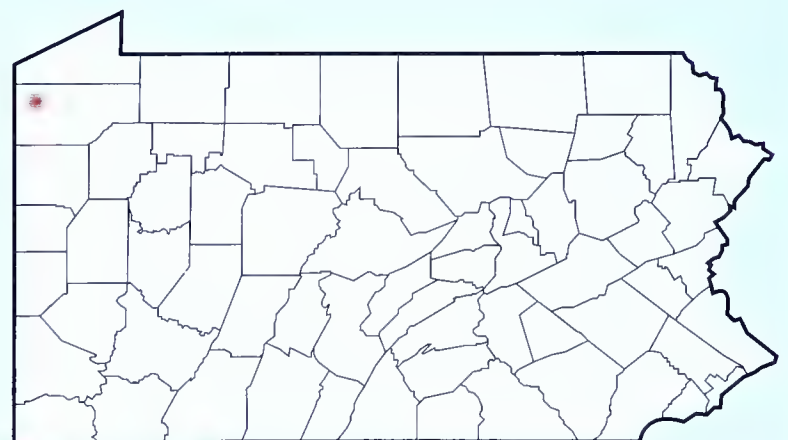
IDENTIFYING CHARACTERISTICS: The northern brook lamprey is a non-parasitic fish. It reaches six inches in length. Like other lampreys, it has a single, round sucker-like mouth disc, but its disc is narrower than the body width where the gill openings are found. A single large tooth with two blunt cusps is above the small mouth opening, and six to 11 blunt teeth are arranged in a line below the opening. Rows of smaller single teeth are situated around these larger teeth. The body is scaleless, with the first and second dorsal fins joined and connected to the tail fin. Except for an anal fin, sometimes connected to the tail fin, there are no other fins.

BIOLOGY-NATURAL HISTORY: Spawning adults gather in the shallow water of creeks and small rivers during May and June. The sucking mouth is used to remove stones up to six inches in diameter, to create a spawning depression among coarse gravel rocks and beneath larger rocks. The bodies of spawning individuals are generally vertically oriented. Several days after spawning, the adults die. The sticky mass of eggs hatches in 15 to 30 days, releasing small larvae (ammocoetes) which make "U"-shaped burrows in the silt and sand bottom of quieter areas of the stream. Ammocoetes develop a hooded mouth structure and feed on small, one-celled plants and animals. After three to four years, teeth develop within the hooded mouth and the digestive tract degenerates. Newly transformed adults are about five to six inches long. Sexual maturity is attained just before the spawning period.

PREFERRED HABITAT: The northern brook lamprey inhabits clean headwater areas of creeks and small rivers with coarse gravel to rock bottoms located in once glaciated terrain.

REASONS FOR BEING ENDANGERED: This species is rare throughout its limited Great Lakes and disjunct midwestern range. It is known in Pennsylvania only from a limited portion of Conneaut Creek in Crawford County.

MANAGEMENT PRACTICES: Watershed management is necessary to maintain the undisturbed habitat and water quality required by this species. Larvicides used to control parasitic sea lamprey populations must not be applied in northern brook lamprey habitat.



● = verified after 1980 ● = historical occurrences

Northern Madtom

Noturus stigmosus



Rob Crowell

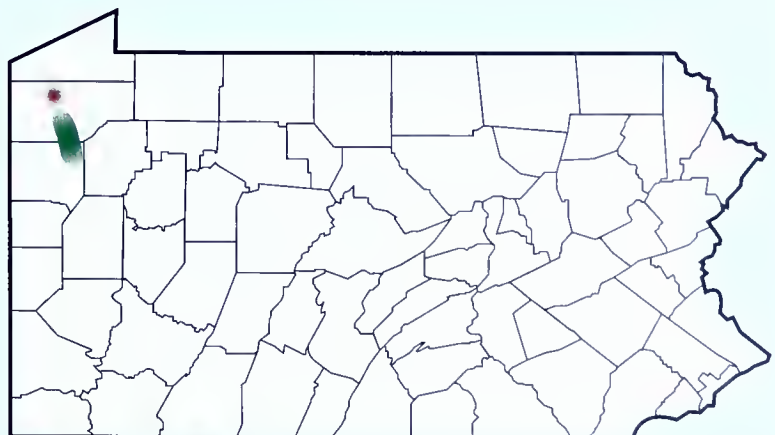
IDENTIFYING CHARACTERISTICS: This small catfish reaches a maximum size of about four inches. The curved spines of each pectoral fin are strongly toothed on both front and hind margins. More dark mottling is evident on the body, as compared to the mountain madtom, and the middle of the tail fin is marked with a dark bar. Its adipose fin is higher than the mountain madtom's.

BIOLOGY-NATURAL HISTORY: Spawning occurs in the spring and in late July. Females deposit sticky egg masses beneath flat stones where there is moderate current. The male then guards the eggs and herds the young for a time following hatching.

PREFERRED HABITAT: The northern madtom is found in the same habitat as the mountain madtom, but prefers a bottom of shifting sand and mud in moderate current. Swifter portions are usually avoided, as are very silted areas.

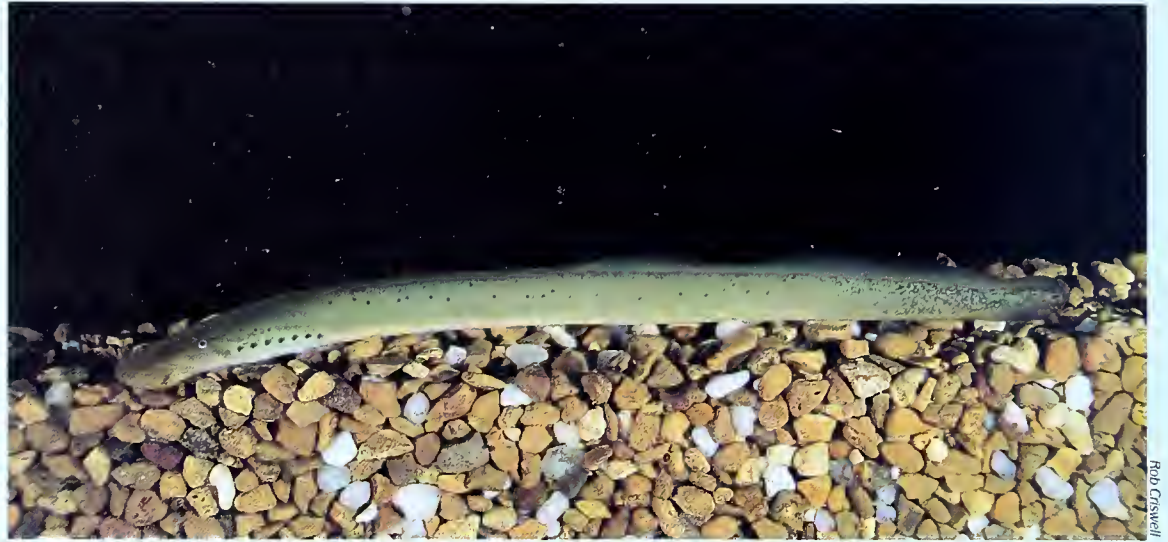
REASONS FOR BEING THREATENED: The situation with this species parallels that of the mountain madtom. It has a more restricted overall distribution than that species, and in Pennsylvania it is presently confined to French Creek.

MANAGEMENT PRACTICES: Like the spotted darter and the mountain madtom, this fish, too, is dependent upon the quality of the upper Allegheny River system and is an excellent barometer of any habitat changes.



Ohio Lamprey

Ichthyomyzon bdellium



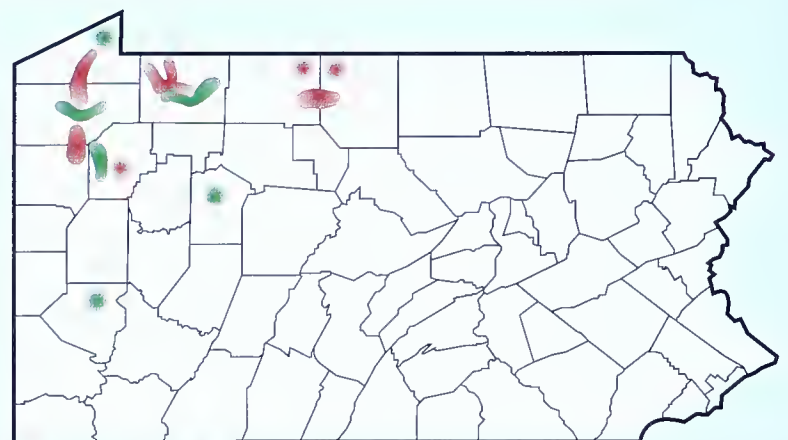
IDENTIFYING CHARACTERISTICS: This parasitic fish reaches 14 inches in length. The expanded sucking mouth disc is as wide as the body, and bears nine large teeth with two or three sharp cusps around the top and sides of the mouth opening. A single row of smaller single-pointed teeth lies beneath the mouth opening. Regular rows of generally smaller teeth are arranged around the remainder of the disc.

BIOLOGY-NATURAL HISTORY: Spawning occurs from spring to early summer, in a depression among gravel and rocks. The bodies of spawning individuals are horizontally oriented. Adults die soon after spawning. Ammocoetes form “U”-shaped burrows in the quieter portions of the stream in a sandy to clean detritus area, and capture very small plant and animal material with the hooded mouth. Transformation to the adult form begins during the spring months, perhaps five to seven years later. At that time the lampreys are up to six inches long and develop a complete digestive tract and a toothed mouth disc. These young, still immature individuals, then move downstream into larger waters, where they attach themselves to suckers, bass, walleye and other fishes. After feeding and growing for another year, the large, now sexually mature adults move upstream to spawning sites.

PREFERRED HABITAT: This species primarily inhabits clean, moderate to large streams of the upper Allegheny River system. Bottom material consists of gravel, rubble and unconsolidated rocks, which is mixed with sand, clean detritus and muck. Current velocity is moderate at spawning sites and slower where ammocoetes burrow.

REASONS FOR BEING THREATENED: The Ohio lamprey was once more widely distributed in the Ohio River basin. The construction of dams, which impeded its upstream spawning migrations, and the siltation and dredging in the lower part of the basin, along with pollution of various types, made these habitats unsuitable. Its numbers have fluctuated greatly over the years, but it is apparently declining in parts of its range in Pennsylvania.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. As the quality of this habitat goes, so go the species dependent upon it.



● = verified after 1980 ● = historical occurrences

Red-Bellied Turtle

Pseudemys rubriventris



Robert T. Zippin/Nature's Images

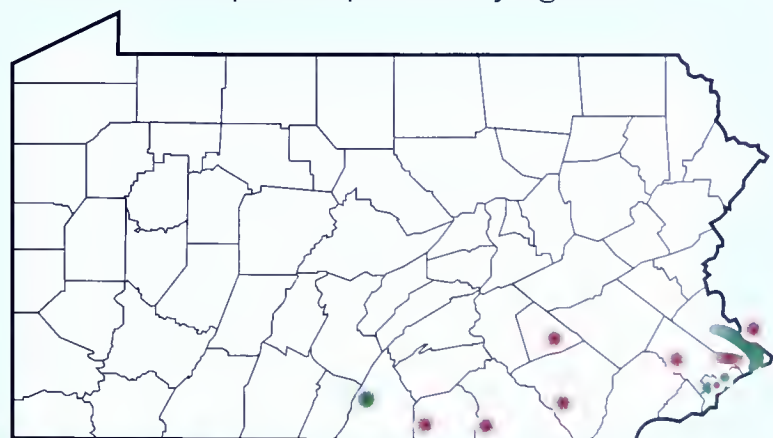
IDENTIFYING CHARACTERISTICS: Next to the snapping turtle and spiny softshell turtle, this is the largest of Pennsylvania's turtles. Fully grown individuals are 10 to 12½ inches in length (record—15¾ inches) and resemble an overgrown painted turtle. Males especially may be almost entirely black, but there is usually a trace of reddish lines on the medially flattened upper shell and yellowish head stripes. The tip of the upper jaw is notched with toothed cusps on each side. The lower shell ranges in color from coral-pink to red, with darker markings in the young.

BIOLOGY-NATURAL HISTORY: Red-bellied turtles are active from May until October, spending much time sunning (basking) on logs or rocks. During June and July, females dig nests in cultivated open tracts, sometimes some distance from water. Usually 10 to 12 eggs are deposited four inches below the surface, and the nest is then covered by the female. Some females may nest more than once a year. The time of hatching is believed to be in late summer, and young may overwinter in the nest. Young and adults feed on a variety of aquatic animals and plants, but fish are not normally part of the diet.

PREFERRED HABITAT: Relatively large, deep creeks, rivers, ponds, lakes and marshes with ample basking sites are preferred. The species tolerates brackish water conditions, but is usually a freshwater turtle, found close to the coast from southern Massachusetts to northeastern North Carolina.

REASONS FOR BEING THREATENED: The limited habitat required by red-bellied turtles is under threat from industrial uses, the demand for property in a heavily urbanized area of the state, drainage or filling of wetlands and pollution.

MANAGEMENT PRACTICES: Red-bellied turtle habitat is being monitored by various government agencies. A long-standing population of this species in Bucks County is studied each year by county park personnel under permit from the Fish and Boat Commission. The species is protected by regulation, as are all other state endangered and threatened species.



● = verified after 1980 ● = historical occurrences

Rough Green Snake

Opheodrys aestivus



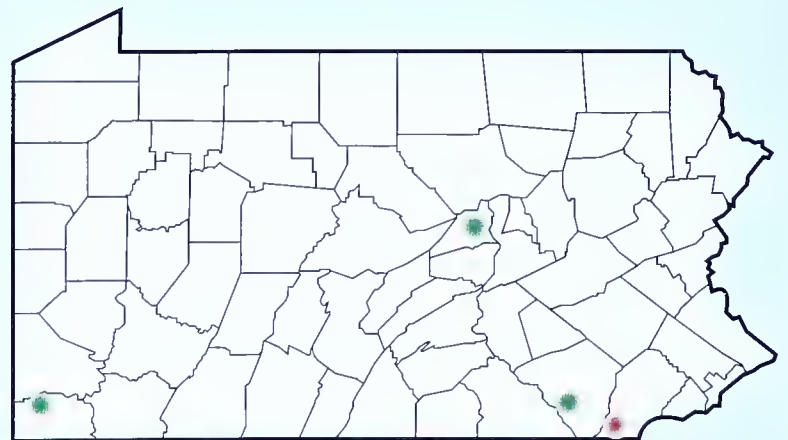
IDENTIFYING CHARACTERISTICS: This is one of two green snakes found in Pennsylvania. Unlike the more widely-distributed smooth green snake, this species has keeled upper body scales and reaches a maximum size of almost 46 inches (26 inches for the smooth green snake). The tail is quite long and tapered relative to the rest of the body.

BIOLOGY-NATURAL HISTORY: Mating takes place in spring, but there are published observations of increased male activity and one mating in September. Females deposit clutches of two to 14 (usually four to six) elongate soft-shelled eggs, which cling together, during June and July. They are deposited in rotten logs or stumps or natural tree cavities some distance above ground, or cavities beneath moss or flat rocks. More than one female may sometimes deposit eggs in the same place. There is one report that some Florida females may hold eggs over winter and deposit them the following spring. Eggs hatch during late August and September; the 7-inch hatchlings are a lighter green than the adults. Caterpillars, grasshoppers, crickets and spiders are primary food items, and are mostly taken from vegetation above ground. When threatened, this snake may react by opening its mouth, revealing the dark lining, but very rarely will one bite.

PREFERRED HABITAT: This snake prefers moist habitats such as wet meadows and the borders of lakes, marshes and woodland streams. It is frequently found in woody vegetation growing along or overhanging water, sometimes up to 20 feet above ground.

REASONS FOR BEING THREATENED: This species is recorded in Pennsylvania only from southern Chester County and Greene County. While the Chester County population persists, there has been no confirmation of its historical occurrence in Greene County. Earlier records indicating a more widespread distribution were probably based on misidentified smooth green snakes.

MANAGEMENT PRACTICES: Habitats required by this snake are also shared by an array of other animals and plants with valuable ecological functions to perform. Further search may reveal other occurrences of this uncommon species, particularly in the southern part of the commonwealth, on either side of the Ridge and Valley province. Wetland habitats continue to require protection.



● = verified after 1980 ● = historical occurrences

Shortnose Sturgeon

Acipenser brevirostrum



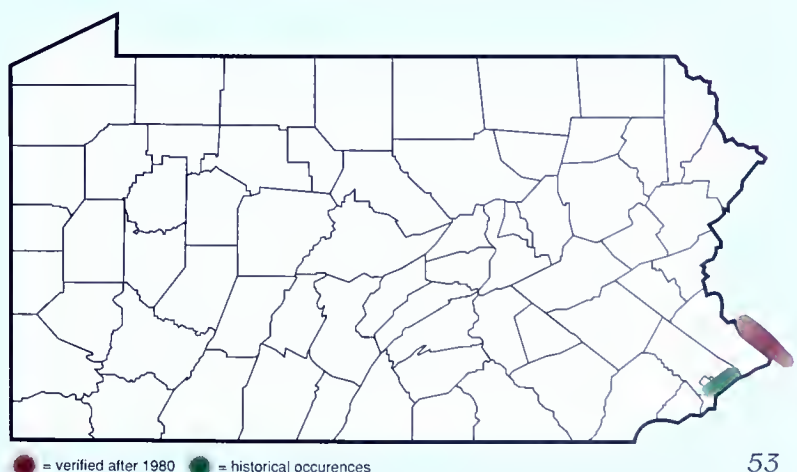
Bowditch National Biological Survey

IDENTIFYING CHARACTERISTICS: The shortnose sturgeon is the smallest of the three sturgeons still found in Pennsylvania, seldom exceeding three feet in length. The body color is dark brown to black on top and lighter brown to yellowish below. The large scales along each side are much lighter than the body color, and the paired fins are outlined in white.

BIOLOGY-NATURAL HISTORY: Male shortnose surgeon mature after four years at a size of 20 inches, females mature after five years at a size of 24 inches. Spawning takes place in large tidal rivers from April to early June; the eggs are small, dark brown, and less numerous per pound of fish than other sturgeons. Young are rarely seen, so early life history is unknown. Adults live in salt or brackish Atlantic coastal waters during most of the year, feeding on bottom-dwelling invertebrates and plant matter intermingled with bottom mud.

REASONS FOR BEING ENDANGERED: Along with exploitation by commercial fishermen, pollution of tidal streams and estuaries used by spawning adults and as nursery areas for young is considered the primary reason for the great decline in shortnose sturgeon.

MANAGEMENT PRACTICES: The National Marine Fisheries Service has produced various management strategies as part of a Shortnose Sturgeon Recovery Plan. These strategies include inventory and monitoring of natural populations, enforcement of existing environmental regulations concerning pollution, creation of new regulations, and studies of shortnose sturgeon environmental needs and limiting factors.



Spotted Darter

Etheostoma maculatum



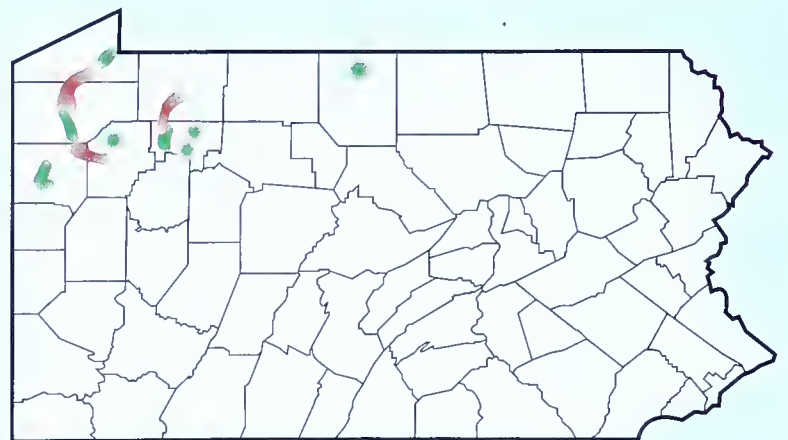
IDENTIFYING CHARACTERISTICS: This darter reaches a maximum length of $2\frac{3}{4}$ inches. The snout is sharp-pointed and narrow, the gill cover scaled, and the tail fin somewhat rounded. The body is variably dusky with small red spots scattered over the sides. Dark horizontal bands may be found on the hind portion of the sides. The margins of the dorsal, tail and anal fins are unmarked, but these fins are dusky (males) or spotted (females) basally.

BIOLOGY-NATURAL HISTORY: In June, males defend territories about a yard apart at the head of deep, swift large stream riffles. The space beneath larger rocks making up a gravel-rubble bottom is selected as the site for spawning. Eggs are deposited in small, wedge-shaped batches on the underside of rocks during two to four spawnings. Some hatchlings may be consumed by adults; otherwise adults and young feed heavily on small aquatic insect larvae.

PREFERRED HABITAT: This species requires large unpolluted streams, spending most of its time in deep riffles, or pools just downstream, where a gravel-rubble bottom predominates, and bottom current velocity is low.

REASONS FOR BEING ENDANGERED: The spotted darter is known in Pennsylvania only from the upper Allegheny River and French Creek. This disjunct locality is one of only three widely separated localities—in the Ohio River and Cumberland and Tennessee River systems—constituting its known distribution.

MANAGEMENT PRACTICES: Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. As the quality of this habitat goes, so go the species dependent upon it. The spotted darter and other animals associated with it in this habitat are excellent, sensitive barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Tippecanoe Darter

Etheostoma tippecanoe



Bob Crowell

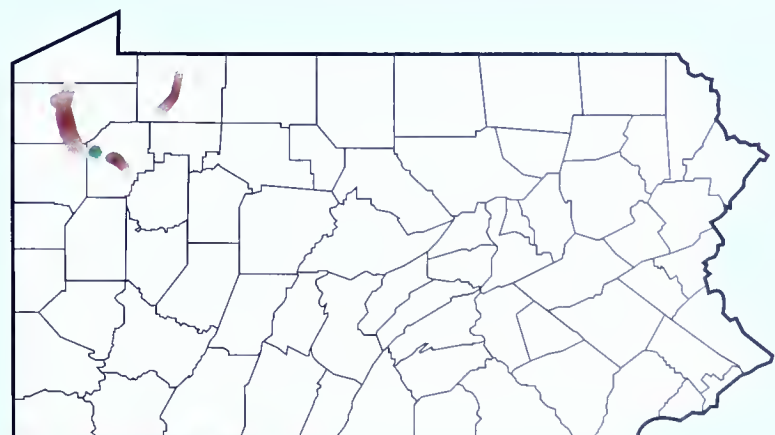
IDENTIFYING CHARACTERISTICS: The tippecanoe darter is one of our smallest fishes, reaching a length of only $1\frac{1}{3}$ inches. The body and fins of males are basically dusky, with scattered dark spots and vertical banding rearward; the fins in both sexes are marginally pale, but basally spotted in the female. The top of the head between the eyes is very dark. Breeding males develop a bright orange throat, belly and fin margins. The scales along the midline of each side bearing sensory pores (lateral line scales) end at about the level of the soft dorsal fin front margin. The belly bears very few scales.

BIOLOGY-NATURAL HISTORY: Males apparently establish territories in late spring to early summer within riffle areas. Brightly colored males and spent females were found in Kentucky in August. This species is apparently more sensitive to turbidity than other darters. The number of individuals in a population varies greatly from year to year, depending on the survival of the young. In one study, adult males lived up to three years, females two.

PREFERRED HABITAT: This little darter prefers riffle areas four to 20 inches deep, in clean rivers and large creeks with a bottom of pea-sized, clean gravel and a high bottom current velocity.

REASONS FOR BEING ENDANGERED: The tippecanoe darter has a distribution similar to that of the spotted darter, i.e., a disjunct upper Allegheny River and French Creek occurrence, and a separate Kentucky-Green-Cumberland and Tennessee River basins occurrence.

MANAGEMENT PRACTICES: As the tippecanoe darter is apparently more sensitive to changes in turbidity, land-use practices contributing to increased siltation should not be permitted. Strict watershed management is required to safeguard against the physical and chemical deterioration of the upper Allegheny River system. This darter and other animals associated with it in this habitat are excellent barometers of the health of this stream system.



● = verified after 1980 ● = historical occurrences

Box Huckleberry

Gaylussacia brachycera
(Mich.) Gray



Carl Keener, Penn State University

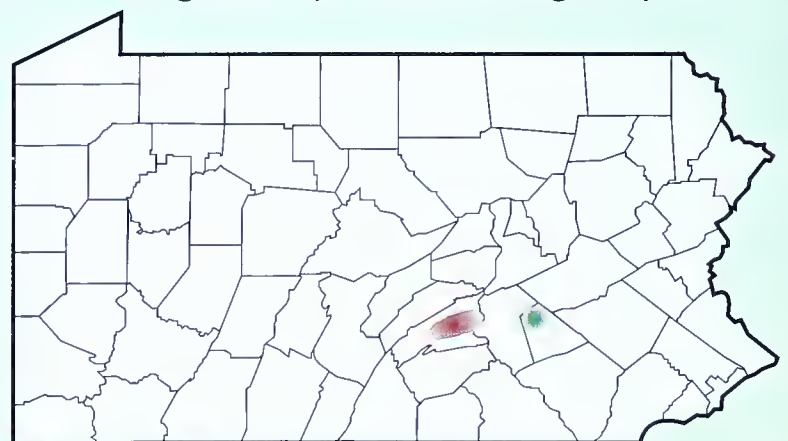
IDENTIFYING CHARACTERISTICS: Box huckleberry is a low shrub with branches that rise to about one foot from underground, creeping stems, known as rhizomes. Its glossy, leathery leaves lack the resinous dots of other huckleberries, and it holds its leaves year-round while the others are deciduous. Its flowers, white or pinkish, are bell-shaped. Fruits are similar to blueberries, but have fewer, larger seeds.

BIOLOGY-NATURAL HISTORY: Box huckleberry is a long-lived perennial that belongs to the Heath Family (*Ericaceae*). One bush in Perry County, is estimated to be more than 1,300 years old. New stems spread from the underground rhizomes at a rate of six inches a year, replacing older, dying branches in a continuous process of vegetative reproduction. Box huckleberry blooms in May and early June.

PREFERRED HABITAT: Box huckleberry is typically found on north-facing slopes over acidic shale bedrock. Populations are known from Pennsylvania, New Jersey, Delaware, Maryland, West Virginia, Virginia, Tennessee and Kentucky. It's considered a species of special concern throughout most of this range.

REASONS FOR BEING THREATENED: Only three populations of box huckleberry have been found in Pennsylvania. One large population is well protected in a state forest natural area, another has been damaged by road construction. The third has not been seen since 1930. Studies show that germination rate is very low and seedlings are so weak they are unable to grow. Box huckleberry populations are thought to be limited to asexual reproduction by spreading rhizomes.

MANAGEMENT PROGRAMS: One box huckleberry population is protected within the Box Huckleberry State Forest Natural Area. In addition, the National Park Service has designated this area as a National Natural Landmark. State Forest rules and regulations prohibit the taking of any plant from state forest land. Wild Plant Management Permits are required prior to collecting Endangered and Threatened plant species for scientific purposes. Further roadwork is unlikely to cause more damage to the second population because the box huckleberry is listed as Threatened and, therefore, protected by regulatory agencies.



● = verified after 1980 ● = historical occurrences

Canby's Mountain-Lover

Paxistima canbyi Gray

IDENTIFYING CHARACTERISTICS: Canby's mountain-lover is a small evergreen shrub, eight to 16 inches high with simple, opposite, leathery leaves less than 1/2-inch long. Very small green flowers with four sepals and four petals arise from upper leaf axils.

BIOLOGY-NATURAL HISTORY: This species belongs to the Staff-Tree Family (*Celastraceae*). Branches of Canby's mountain-lover spread along the ground and sprout roots where soil conditions are favorable. In this way the plant forms colonies which are genetically identical. Flowers open in April and May. A second species of *Paxistima* occurs in the Pacific states.

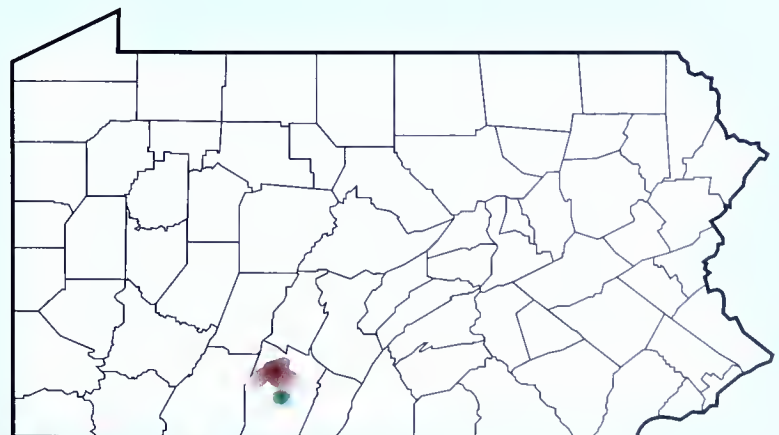
PREFERRED HABITAT: Canby's mountain-lover occurs in rocky well-drained upland woods from Pennsylvania to Ohio, south to North Carolina and eastern Kentucky. Pennsylvania populations are found on west and northwest facing forested slopes, climbing over exposed shale and limestone formations. Southern Pennsylvania is the northern limit of this species' range.

REASONS FOR BEING ENDANGERED: Canby's mountain-lover is rare throughout its natural range. Two of the three historical Pennsylvania locations have been located, but could be threatened by railroad and quarrying expansions. Used commercially as an ornamental groundcover, some Canby's mountain-lover being sold by nurseries may have been dug from the wild.

MANAGEMENT PROGRAMS: Canby's mountain-lover is listed as a candidate species for federal listing by the USF&WS. It is also listed as Endangered in Maryland, Ohio and Tennessee and as Threatened in Kentucky and Virginia. Landowners need to be encouraged to protect the plants and habitat. Gardeners should buy only plants rooted from nursery stock.



Bureau of Forestry



● = verified after 1980 ● = historical occurrences

Eared False-Foxglove

Tomanthera auriculata
(Michx.) Raf.

IDENTIFYING CHARACTERISTICS: Eared false-foxglove is an herb with a simple hairy stem 12 to 16 inches high. The purple, one-inch flowers bloom in the upper leaf axils, forming a leafy spike. Blossoms are funnel-shaped with five lobes and four stamens. One pair of stamens is longer than the other. The fruit is a capsule about $\frac{1}{2}$ -inch long. Eared false-foxglove is so-named because the uppermost leaves have lobes that stick out at the base, reminding botanists of earlobes.



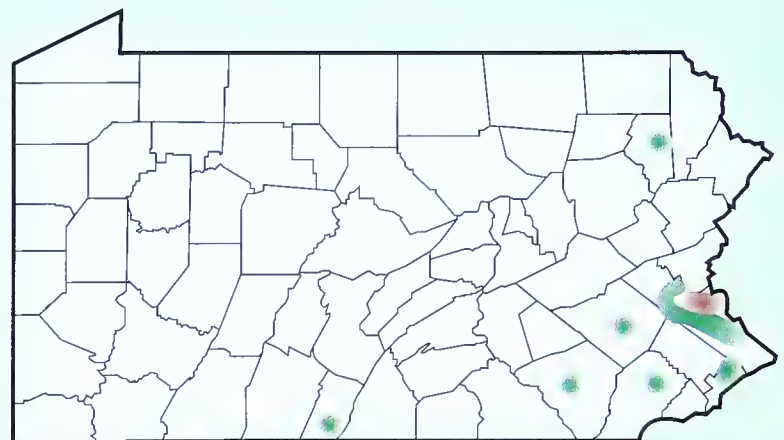
Kathy Regan, The Nature Conservancy

BIOLOGY-NATURAL HISTORY: Eared false-foxglove, an annual, is a member of the Figwort Family (*Scrophulariaceae*). The flowers resemble the garden foxgloves of the genus *Digitalis* to which they are related. Eared false-foxglove blooms in August and September.

PREFERRED HABITAT: This plant grows in prairies, open dry woods and fields. In Pennsylvania, it is currently surviving at only two locations, on limestone gravel on the edge of an abandoned zinc mine. This species is extremely uncommon, with an historical range extending from northern New Jersey, across Pennsylvania and Ohio, to southern Minnesota, south to Virginia, Alabama, Tennessee and Missouri. A second species of *Tomanthera* grows from Kansas south to Texas.

REASONS FOR BEING ENDANGERED: Of 16 known Pennsylvania locations, populations of eared false-foxglove can be found today at only two. Several populations were destroyed during road construction. Many of the historical sites in eastern Pennsylvania may have suffered the same fate. This species is endangered or threatened in nine other states. Eared false-foxglove has been extirpated from Indiana, Maryland, New Jersey and possibly Wisconsin. Habitat destruction for development is the leading cause of this species decline.

MANAGEMENT PROGRAMS: Eared false-foxglove is a candidate for listing under the Federal Endangered Species Act. It is one of five species in Pennsylvania to receive funding for status survey and monitoring work through a cooperative agreement with the USF&WS. A 5-year plan has been developed to search for historical populations and to protect known sites. Environmental assessments using PNDI will help to avoid impacts to any new and existing plant locations.



● = verified after 1980 ● = historical occurrences

Glade Spurge

Euphorbia purpurea Fern.



Ann Rhoads, Morris Arboretum

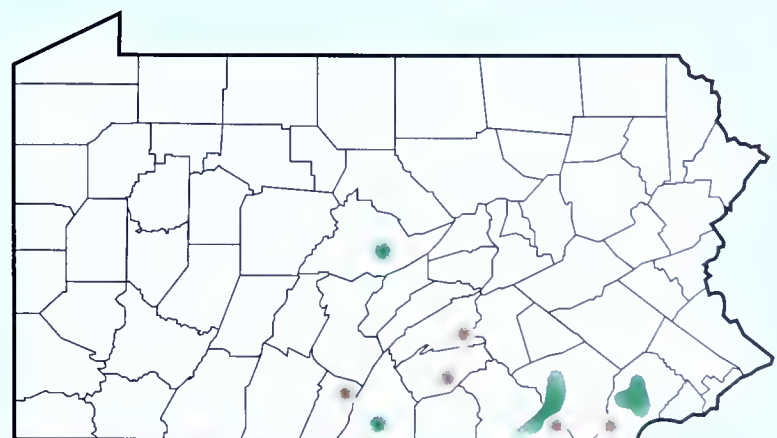
IDENTIFYING CHARACTERISTICS: Glade spurge is a perennial herb with thick stems up to three feet tall. The entire 3-inch leaves are hairy, feeling soft to the touch. Flowers emerge from slender branches in the upper leaf axils. They are small, purple and cup-shaped, and have no petals.

BIOLOGY-NATURAL HISTORY: Glade spurge was first described from plants collected in Pennsylvania in 1838. The genus *Euphorbia* belongs to the Spurge Family (*Euphorbiaceae*). Like other euphorbias, the glade spurge has milky sap which may repel plant-eating insects and other animals. Glade spurge sprouts from a short thick underground stem. It blooms from July to September.

PREFERRED HABITAT: This species is found in rich seepage wetlands and thickets, from New Jersey and Pennsylvania, west to Ohio and south to Tennessee and North Carolina.

REASONS FOR BEING ENDANGERED: Glade surge is a species of special concern throughout its natural range. It is listed as endangered in Pennsylvania and Maryland, threatened in Virginia and extirpated in Delaware. In Pennsylvania, 13 plant sites were documented in the past. Of these, one was destroyed by agriculture, three support suitable habitat but no plants, four have healthy glade spurge populations, and six locations remain to be searched. A previously unknown population was discovered during field surveys of appropriate habitat. The glade spurge is threatened by habitat destruction and water quality degradation.

MANAGEMENT PROGRAMS: This species is a candidate for listing as federally endangered or threatened by the USF&WS. One population site is owned by The Nature Conservancy and is being monitored annually. Three other sites are owned by either the Bureau of State Parks, the Game Commission or Bureau of Forestry. The Forestry site is located in a designated natural area. Agreements are being developed between the agencies to monitor and protect the plants.



● = verified after 1980 ● = historical occurrences

Hispid Gromwell

Lithospermum caroliniense Macm.

IDENTIFYING CHARACTERISTICS:

Hispid gromwell is an herbaceous perennial. It sends up erect stems, one to two feet high, from a stout woody root.

The 1- to 3-inch narrow leaves are rough-hairy. The bright orange-yellow, funnel-shaped flowers, $\frac{1}{2}$ - to 1-inch wide, are produced in terminal leafy racemes, and are very conspicuous.



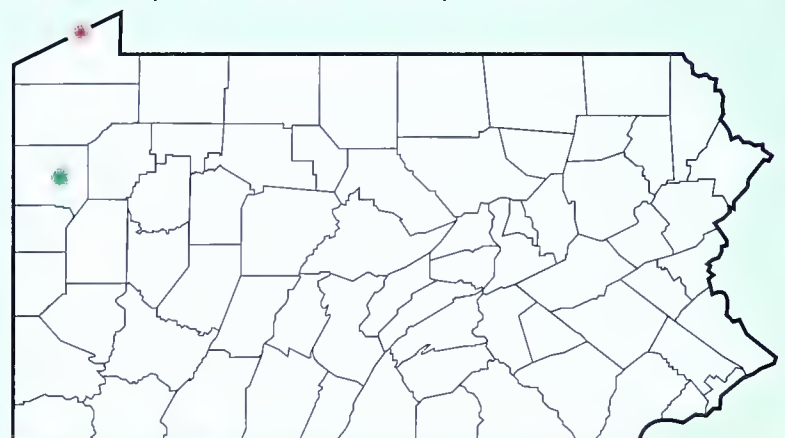
Cleveland Museum of Natural History

BIOLOGY-NATURAL HISTORY: The genus *Lithospermum* belongs to the Borage Family (*Boraginaceae*). This species was originally found from Missouri, Kansas and Montana, south to Arkansas, Oklahoma, Texas and Florida. Populations around the Great Lakes are sometimes considered a separate species from their southern relations, but the differences are very minor. A purple dye can be made from the taproot, so the plant is sometimes destroyed by collectors. Hispid gromwell blooms from May to July. Studies by Mercyhurst College in Erie show that the plant is pollinated by several insects, but was most often visited by *Poanes hobomok*, the northern golden skipper.

PREFERRED HABITAT: This species grows on sandy dry sites of shores and coastal plains of the Great Lakes. In the southern part of its range, the hispid gromwell grows in sandy fields, barrens and roadsides. It can also be found in pine barrens and sandy woods from Virginia to Florida.

REASONS FOR BEING ENDANGERED: Although the species is secure in other parts of its range, hispid gromwell is endangered in Pennsylvania because only one population occurs here, within Presque Isle State Park. Results of studies identify deer browse, not the lack of pollinators, as the principal threat to the plants. Deer, recreational activities, exotic plant invasion and beach erosion control measures have damaged these plants in the past and continue to pose a threat to the populations.

MANAGEMENT PROGRAMS: The Bureau of State Parks has classified the locations on Presque Isle where this species can be found as "environmentally sensitive areas." As such, management activities to protect this and other plants species of special concern will be implemented.



● = verified after 1980 ● = historical occurrences

Jacob's Ladder

Polemonium van-bruntiae Britt.

IDENTIFYING CHARACTERISTICS: Jacob's ladder is named for the regular arrangement of its 15 to 21 narrow egg-shaped leaflets. Clusters of blue-purple bell-shaped $\frac{3}{4}$ -inch flowers top the erect 1- to 2-foot stems. Jacob's ladder is often mistaken for the more common, Greek valerian (*Polemonium reptans*), which is smaller and has stamens that do not protrude from the flower. Jacob's ladder is much larger and has stamens that extend beyond the petals.



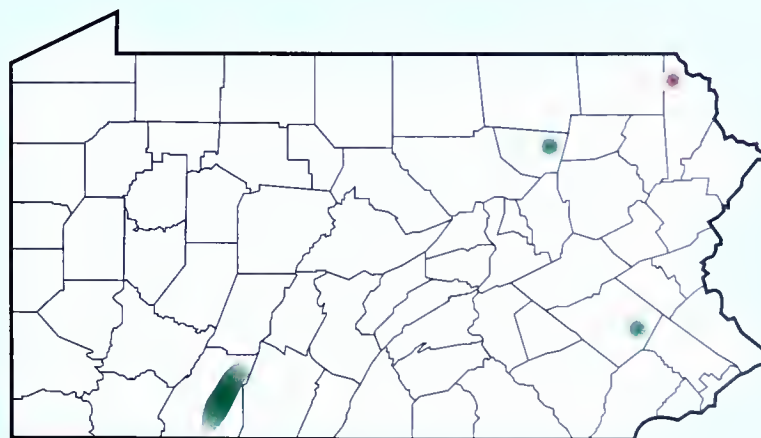
Ann Riechels, Morris Arboretum

BIOLOGY-NATURAL HISTORY: Members of the Phlox Family (*Polemoniaceae*), both *Polemonium* species occur in Pennsylvania. While the more common Greek valerian grows in rich moist woods, Jacob's ladder is limited by its special wetland habitat requirements. Jacob's ladder blooms in June and July.

PREFERRED HABITAT: Jacob's ladder is found in open, acidic peatlands in mountainous areas of Vermont, New York, Pennsylvania, Maryland and West Virginia.

REASONS FOR BEING ENDANGERED: Wetland alteration and destruction are the primary reasons for this species' decline. Collecting by gardeners has added to the problem. Jacob's ladder is considered threatened throughout its natural range. Although five locations have been reported in Pennsylvania, only one population, of about 150 plants, remains intact. In fact, this species was thought to have been lost from our flora until the Morris Arboretum field team found a site in 1986. A western Pennsylvania population was destroyed by the creation of a man-made lake in 1966, which flooded its high mountain bog habitat. A second location in eastern Pennsylvania is thought to have been lost due to wetland draining for agricultural purposes. Searches for remaining sites continue, although historical information is sketchy.

MANAGEMENT PROGRAMS: Jacob's ladder is a candidate for listing as endangered or threatened under the federal Endangered Species Act. State and federal wetland policy and laws regulating wetland activities will help protect the only known location. The Nature Conservancy considers this site to be a high priority and has begun protection activities to contact landowners and to monitor the plants and habitat.



● = verified after 1980 ● = historical occurrences

Jeweled Shooting-Star

Dodecatheon amethystinum Fassett

IDENTIFYING CHARACTERISTICS: The jeweled shooting-star has deep red-purple flowers. The petals bend backwards while the stamens form a cone in the center, giving the impression of a falling star or comet. The flowers are arranged in an attractive, nodding umbel at the top of a 1-foot stem, above a basal rosette of leaves.



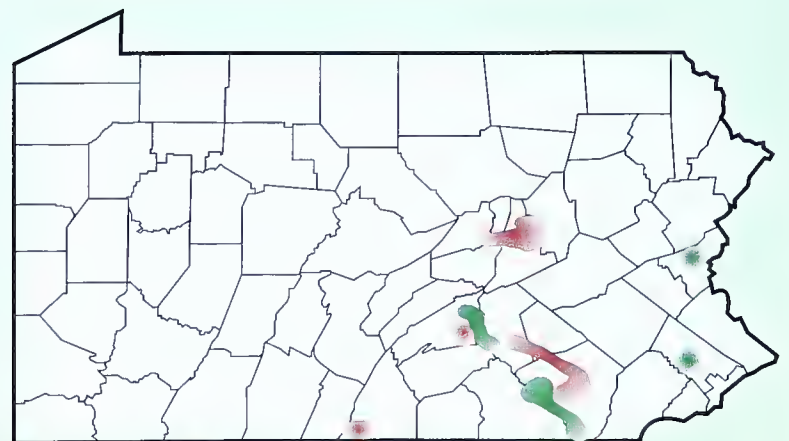
Tom Smith, Virginia Division of Natural Heritage

BIOLOGY-NATURAL HISTORY: The jeweled shooting-star belongs to the Primrose Family (*Primulaceae*). There are two *Dodecatheon* species in Pennsylvania. *D. amethystinum* is distinguished from *D. meadia* by a thinner fruit wall and the deeper red-purple flower color. Blossoms of jeweled shooting-star open in late April to May.

PREFERRED HABITAT: This species is quite rare in parts of its natural range. It grows on moist, shaded areas of east and north facing limestone outcrops and river bluffs. The plants often occur on rock ledges that receive dripping water or along wet cliffs, but are also known from dry to moist alkaline bluffs.

REASONS FOR BEING THREATENED: Fourteen populations are known to exist in Pennsylvania. Four historically documented sites were lost to development and railroad line blasting. Limestone mining and development continue to threaten some populations. Plants growing near railroads may be threatened by herbicides used to keep tracks clear of weeds.

MANAGEMENT PROGRAMS: One jeweled shooting-star site has been registered through The Nature Conservancy's Landowner Contact Program. Environmental assessments for development or road expansion should include measures to protect this plant. Landowner contact should be pursued to protect other known plant sites.



● = verified after 1980 ● = historical occurrences

Large-Flowered Marshallia

Marshallia grandiflora
Beadle & F.E. Boynton

IDENTIFYING CHARACTERISTICS: Large-flowered marshallia has single, long-stalked flowerheads composed of pink or lavender, tubular blossoms with blue anthers. The larger leaves are thick, with three main veins. The flowering stems can be 10 to 36 inches high.

BIOLOGY-NATURAL HISTORY: Large-flowered marshallia is a perennial member of the Aster Family (*Asteraceae*). It blooms in June and July. There are four species of *Marshallia* in the United States, but only this species is found this far north. As its name suggests, this species has the largest flowers of the four.

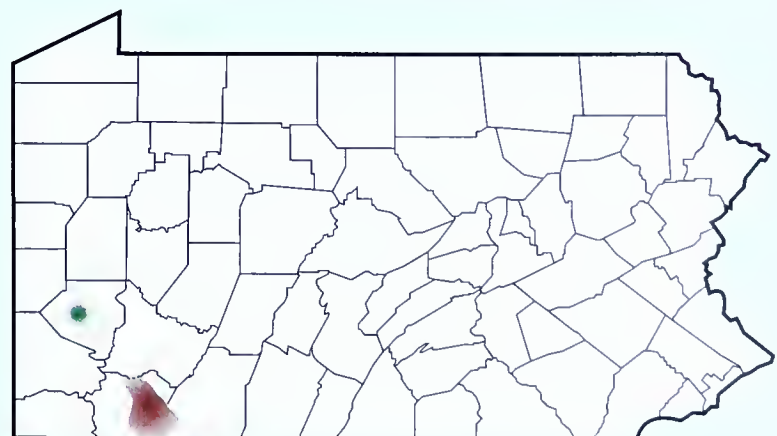
PREFERRED HABITAT: In Pennsylvania, this plant grows only in crevices of flood-scoured rock shelves and cobble/sand banks of the Youghiogheny River. The regular flood cycles of the river may be necessary to prevent competing grasses and shrubs from taking over the sites and squeezing out *Marshallia*. It is found in similar habitats in West Virginia, Kentucky and Tennessee.

REASONS FOR BEING ENDANGERED: All 12 Pennsylvania populations are in one river system. Consequently, they are extremely vulnerable because any activity, such as dam construction, could destroy most of the individuals. Other water projects and recreational uses of the river could also impact these plants. Plant populations which occur in state park high-use areas are subject to trampling and collection. *Marshallia grandiflora* is in jeopardy throughout its natural range. It is no longer found in Maryland and North Carolina, is listed as endangered in Kentucky and Tennessee, and is considered threatened in West Virginia.

MANAGEMENT PROGRAMS: The USF&WS lists this plant as a candidate for federal protection. The Bureau of State Parks—the agency responsible for most of the plant populations, is preparing plans which recognize the importance of protecting endangered plant species. Environmental assessment using PNDI will help to avoid potential impact to the plants by state projects and permitted activities.



Paul Weigman, Western Pennsylvania Conservancy



● = verified after 1980 ● = historical occurrences

Northeastern Bulrush

Scirpus ancistrochaetus Schuyler



The Nature Conservancy

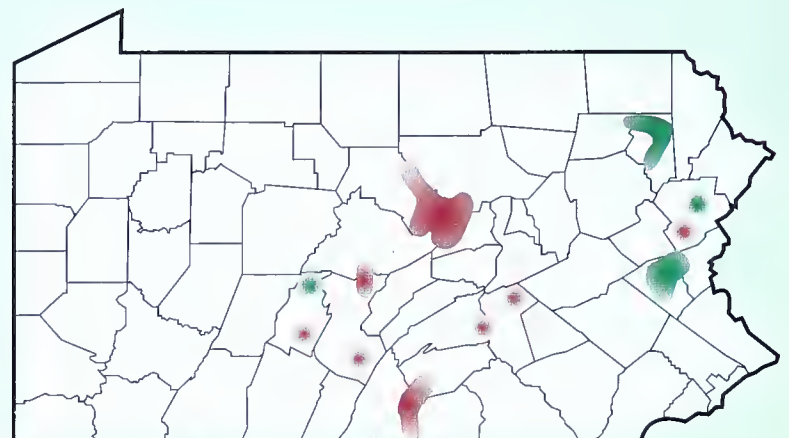
IDENTIFYING CHARACTERISTICS: This tall, leafy plant with erect stems reaches up to 47 inches in height. The clusters of brown flowers have no petals but are surrounded by six rigid, barbed bristles, which is the identifying characteristic of this plant. Another field clue that helps to distinguish this from other bulrushes is the arching rays of the flower cluster.

BIOLOGY-NATURAL HISTORY: The northeastern bulrush is a perennial member of the Sedge Family (*Cyperaceae*). It's considered a "leafy" bulrush because of its conspicuous leaves, unlike those of most other bulrushes. This plant was identified as a new species in 1962, by Dr. Alfred E. Schuyler of the Pennsylvania Academy of Natural Sciences. Flowering stems are produced from short, woody, underground rhizomes. Flowers appear in June and July, and seeds set between July and September. It most often reproduces vegetatively, when new plants develop on stems that have fallen to the ground.

PREFERRED HABITAT: The northeastern bulrush is found in small wetlands, usually one acre or less, where the water level is high in spring and drops through the summer. Its range includes Vermont, Massachusetts, New York, Pennsylvania, Maryland, Virginia and West Virginia.

REASONS FOR BEING ENDANGERED: The unusual wetlands this species requires are impounded or drained for development. Even slight variations in the natural fluctuation of the water table can destroy this plant. Several historical sites in eastern Pennsylvania were destroyed by agricultural activities, development and quarrying. Hydrological studies should be done to determine the degree of impact of nearby activities on these fragile ecosystems. At present, 26 populations are known to be in Pennsylvania, most have been discovered since the species was listed and brought to the attention of ecologists.

MANAGEMENT PROGRAMS: On June 6, 1991, the northeastern bulrush became the second Pennsylvania plant to be listed as a federally endangered species. It is one of five species that will be inventoried and monitored through a cooperative agreement with the USF&WS. A five-year plan has been developed to further understand the species, so conservation measures can adequately protect the plants and habitat. Populations on state forest lands may be included within the Public Wild Plant Sanctuary Network.



● = verified after 1980 ● = historical occurrences

Serpentine Aster

Aster depauperatus Fern.

IDENTIFYING CHARACTERISTICS: Serpentine aster flowers have daisy-like composite heads. What looks like a simple flower is actually a cluster of short white ray flowers surrounding a central disk of tiny tubular flowers. The slender, wiry 1-foot stems are branched and smooth. The leaves are variable in shape and size and usually dry up before the flowers open.



Ann Rhoads, Morris Arboretum

BIOLOGY-NATURAL HISTORY: Serpentine aster belongs to the Aster Family (*Asteraceae*). As its name implies, this species is a plant of serpentine habitats. The mineral serpentine contains toxic amounts of magnesium, nickel and chromium and lacks calcium, potassium and phosphorous. Plants that grow in serpentine soils are usually much different from their relatives in surrounding habitats. This plant is no exception, being much shorter and having smaller leaves than more common asters. How these plants obtain the necessary minerals and avoid being poisoned is still being studied by plant scientists. Serpentine asters bloom from August to October.

PREFERRED HABITAT: Serpentine barrens are a unique habitat type, locally found in parts of Chester, Delaware and Lancaster counties in Pennsylvania and Cecil County, Maryland.

REASONS FOR BEING THREATENED: Of the 16 known serpentine aster populations, only five are adequately protected. In the mid-1800s magnesite was mined from serpentine barrens for the production of epsom salt. Serpentine has also been used as road base material. Quarrying, housing and industrial development continue to jeopardize the 11 remaining sites.

MANAGEMENT PROGRAMS: Serpentine aster is listed as a candidate for federal protection by the USF&WS. One plant site, partly owned by The Nature Conservancy, is managed by the Bureau of Forestry as a State Forest Natural Area. A second is owned by Tyler Arboretum; a third is managed as a county park. Landowner agreements are being pursued for protecting two other sites. State permit review should help protect other sites threatened by development.



● = verified after 1980 ● = historical occurrences

Shale-Barren Evening Primrose

Oenothera argillicola Mackenzie



Carl Keener, Penn State University

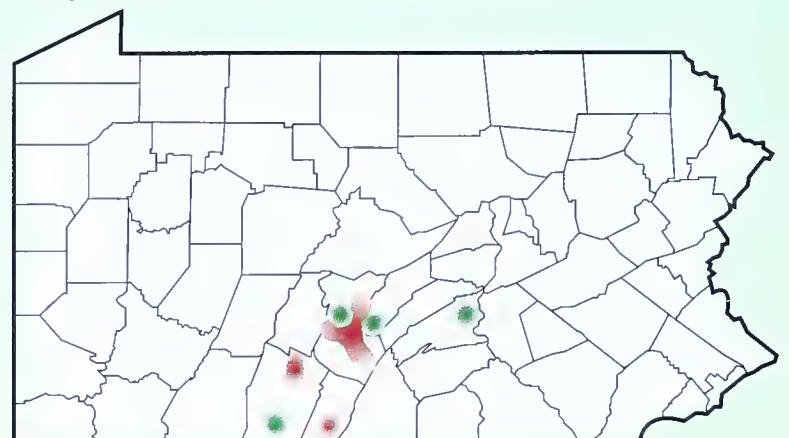
IDENTIFYING CHARACTERISTICS: Evening primroses are erect herbs with alternate leaves and yellow flowers up to two inches wide. Flowers have four petals and a distinctive cross-shaped stigma in the center, which identifies this genus. Shale-barren evening primrose is different from more common species in having the largest flowers, narrower leaves and a different capsule shape.

BIOLOGY-NATURAL HISTORY: The shale-barren evening primrose is a member of the Evening Primrose Family (*Onagraceae*). Evening primroses open at twilight, from late June to October. This species is adapted to hot shale-barren environments. The unusual butterflies and moths that frequent this habitat may be specific pollinators for this and other shale barren plant species.

PREFERRED HABITAT: Shale barrens form when a very brittle type of shale outcrops on south to southwest sides of Allegheny ridges. Most plants are unable to withstand the high temperatures generated when the sun heats the shale. Shale-barren evening primrose is one of a group of endemic plants that have adapted to grow on these sites. Most members of this endemic group are listed as endangered or threatened because they are found only from southern Pennsylvania through West Virginia to southern Virginia, where shale barrens are formed.

REASONS FOR BEING THREATENED: Twelve shale-barren evening primrose populations can be found in Pennsylvania. Threats include road expansion, right-of-way maintenance and quarrying. Several populations have been partly destroyed by the creation of Raystown Lake and one site was lost to a highway roadcut.

MANAGEMENT PROGRAMS: Several plant sites are owned by the Department of the Army and are designated natural areas. Private landowners should be encouraged to protect this plant. Environmental assessment by Penn DOT should prevent further damage to plant locations. Additional searches are needed to assess the status of historically documented populations.



● = verified after 1980 ● = historical occurrences

Showy Lady's Slipper

Cypripedium reginae Walt.

IDENTIFYING CHARACTERISTICS: Showy lady's slipper orchids are named for the inflated pouch formed by the lower petal. The single or paired, 1- to 2-inch white and rose-pink flowers are the largest of our native orchids. Plants stand one to two feet high with 8-inch oval leaves clasping the stems.

BIOLOGY-NATURAL HISTORY: This species is a member of the Orchid Family (*Orchidaceae*). Plants of this genus are perennial herbs. Flowers bloom in June and July.

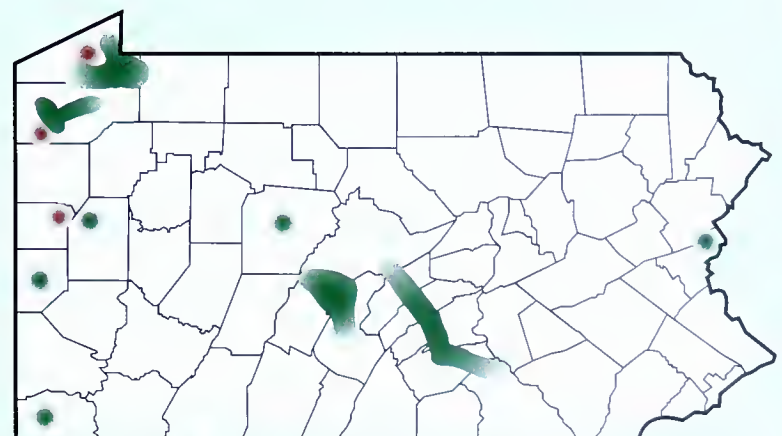
PREFERRED HABITAT: Showy lady's slippers have been found in swamps, bogs and wet woods extending from Newfoundland and Quebec to North Dakota and south through New Jersey, Pennsylvania, Ohio, Indiana, Illinois and Missouri to the Appalachian Mountains as far south as North Carolina and Georgia. Pennsylvania populations historically occurred in alkaline wetlands from northwest through central to southeast areas of the state, but can be found today only in the glaciated northwest.

REASONS FOR BEING THREATENED: Threats include collection by nurserymen and misguided gardeners. The probability of showy lady's slippers surviving a transplant from their wetland habitat is poor. Even casual picking of the flowers destroys the plant's chances of reproducing. Loss of habitat from recreational and housing development, in addition to water pollution from mineral extraction, have taken their toll. Although 29 populations have been documented by historical collections, only five are known to exist here today.

MANAGEMENT PROGRAMS: One showy lady's slipper population is protected in a natural area owned by the Western Pennsylvania Conservancy. A second is located on a state game lands. Owners of the three other sites should be encouraged to protect the plants. Searches must continue to assess the current condition of historically documented plant populations.



Paul Wiegman, Western Pennsylvania Conservancy



● = verified after 1980 ● = historical occurrences

Small Whorled Pogonia

Isotria medeoloides Raf.



Paul Wiegman, Western Pennsylvania Conservancy

IDENTIFYING CHARACTERISTICS:

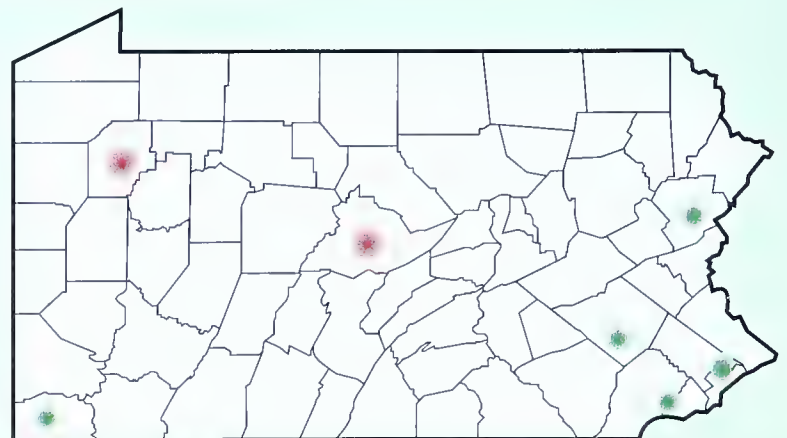
The small whorled pogonia is a delicate orchid with a stout, upright stem eight to 10 inches high, topped with a whorl of four to six (usually five) leaves. Single or paired yellowish-green flowers, 1-inch long, arise from the center of the leaf whorl. This species is most clearly distinguished from the more common *I. verticillata* (large whorled pogonia) by the shape of the sepals. Sepals in the small whorled pogonia are greenish, not spreading, and are less than an inch long. The large whorled pogonia has widely spreading, purplish sepals, 1 ¼ to 2 ½ inches long.

BIOLOGY-NATURAL HISTORY: The small whorled pogonia is a member of the Orchid Family (*Orchidaceae*). Both *Isotria* species are perennials found only in the Eastern United States. *I. medeoloides* is very sparsely distributed from southern Ontario, Canada and Maine, south to Georgia and west to Illinois. Within this region, only 12 of the 17 states which have historically recorded plant sites, are known to still have them. This species is noted for long periods of dormancy, such that colonies often fluctuate in apparent size from year to year. Plants bloom in May and June.

PREFERRED HABITAT: Nearly all small whorled pogonia populations occur in second growth or relatively mature forests. Pennsylvania populations seem to be most abundant on dry east or southeast facing hillsides in mixed oak forests. The soils are generally rocky and somewhat acidic.

REASONS FOR BEING ENDANGERED: The small whorled pogonia is considered our rarest orchid. Only three populations are known in Pennsylvania. Data collected by The Nature Conservancy in 1985 show that approximately 52 populations existed from Ontario to South Carolina. The main threats to this endangered orchid are collecting and habitat alteration.

MANAGEMENT PROGRAMS: The small whorled pogonia has been listed as a federal endangered species since 1982. Inventory, monitoring, and protection work initiated by the Western Pa. Conservancy, will be continued through the use of federal endangered species funds. Plants located on public land will be protected by the managing agency.



● = verified after 1980 ● = historical occurrences

Spreading Globeflower

Trollius laxus Salisb. ssp. *laxus*



Paul Wagoner, Western Pennsylvania Conservancy

IDENTIFYING CHARACTERISTICS:

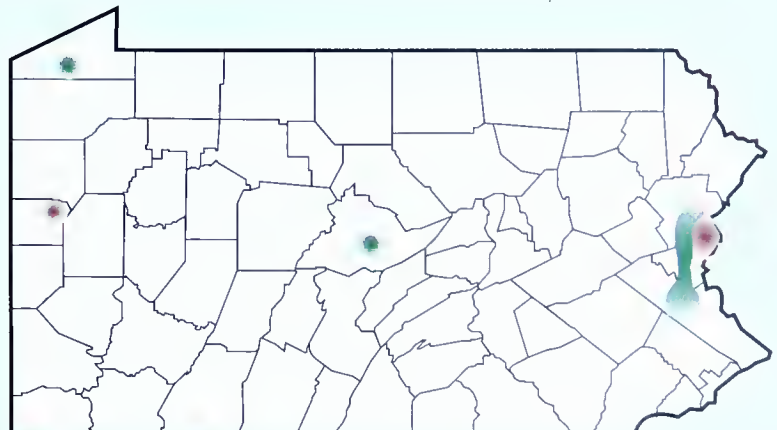
Spreading globeflower is a showy plant with palmately cut, lobed leaves, three to five inches wide. Large terminal flowers, up to 1½ inches in diameter, are yellow or cream-colored. The petals are tiny, but the five to seven large sepals are brightly colored. The plant grows from five to 20 inches.

BIOLOGY-NATURAL HISTORY: Spreading globeflower is a member of the Buttercup Family (Ranunculaceae) with flowers that appear like large buttercups. *Trollius* is a perennial herb that blooms in mid-April. The leaf size increases significantly after blooming. The distinction between eastern and western spreading globeflowers is not clear. The western plants, extending from the Rocky Mountains to the west coast, are thought to be members of a subspecies (ssp. *albiflora*) which have white flowers and are less rare.

PREFERRED HABITAT: Spreading globeflower grows in rich swamps, wet meadows and wet woods from Connecticut and New Jersey west through New York and Pennsylvania to Ohio. In Pennsylvania, its range is limited to the glaciated sections, where wetland habitats are calcareous (alkaline).

REASONS FOR BEING ENDANGERED: Eight of 15 historically documented spreading globeflower sites have been destroyed because the wetlands where they existed were drained or filled for agriculture and housing development.

MANAGEMENT PROGRAMS: Spreading globeflower is a candidate for listing under the Federal Endangered Species Act. One site has been acquired by the Western Pennsylvania Conservancy. The Nature Conservancy is trying to protect four sites in eastern Pennsylvania. A coal mine was modified to prevent disruption of the hydrology at a western Pennsylvania location. Surveys for this and other wetland plant species of special concern continue to be concentrated in the glaciated sections of the state.



Swamp Pink

Arethusa bulbosa L.

IDENTIFYING CHARACTERISTICS: The swamp pink is a magenta-pink orchid with flowers one to two inches long. The lower lip is purple-spotted and crested with yellow hairs. The flower stalk, 2 to 15 inches, arises from a bulb loosely rooted among mosses. A single, grasslike leaf develops after the plant blooms.



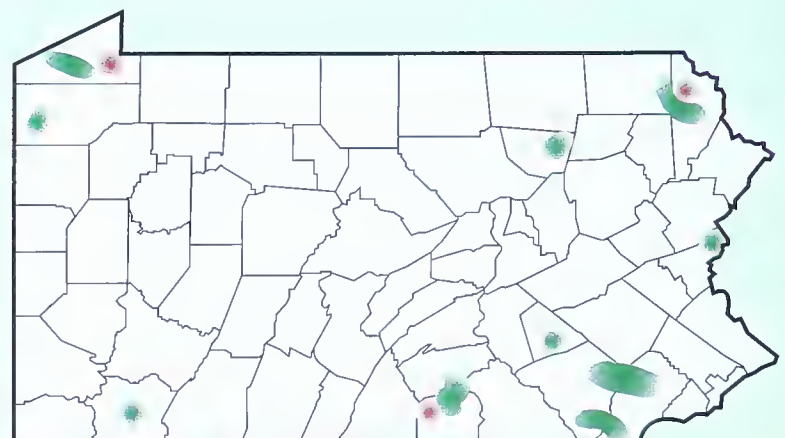
Paul Wiegman, Western Pennsylvania Conservancy

BIOLOGY-NATURAL HISTORY: Swamp pink, an herbaceous perennial, is a member of the Orchid Family (*Orchidaceae*). Flowers bloom in May and June. It is rare throughout its range. There are only two species of *Arethusa* in the world, ours and one in Japan.

PREFERRED HABITAT: Swamp pink grows in open, sunny sphagnum moss bogs and swampy meadows. This species ranges from Newfoundland to Minnesota, south to Delaware, Maryland and northern Indiana, and in the mountains to South Carolina, but it is apparently absent from large portions of this range.

REASONS FOR BEING ENDANGERED: Only three of 26 historical populations in Pennsylvania can still be found. One population was destroyed when its wetland habitat was inundated during the creation of Pymatuning Reservoir. Eight populations have not been relocated although suitable habitat still remains at the sites. It is suspected that these plants were stolen. Collection, deer browsing, and habitat destruction contribute to the decline of this beautiful orchid.

MANAGEMENT PROGRAMS: One population is in a privately owned natural area. The site is monitored by the Presque Isle Audubon Society and the Botanical Society of Western Pennsylvania. Habitat at a second site is protected by current state regulations. Plants from the third site located on State Forest land will be included in the Public Wild Plant Sanctuary Network. State regulations prohibit the taking of any plant from State Forests. In addition, the Wild Resource Conservation Act sets fines for removal of Endangered and Threatened plant species, without landowner permission, at \$100 per plant.



● = verified after 1980 ● = historical occurrences

Tall Larkspur

Delphinium exaltatum Ait.



Carl Keener, Penn State University

IDENTIFYING CHARACTERISTICS:

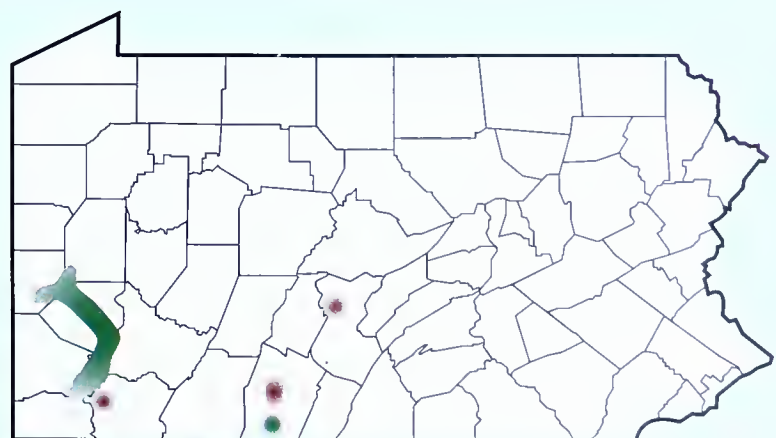
Larkspurs have distinctive flowers with four blue petals and one sepal elongated into a slender spur, which gives the plant its name. The leaves are deeply lobed into irregular segments. Our two native larkspurs can often be distinguished by the difference in their height at blooming periods. Tall larkspur blooms in late summer and grows two to six feet, while dwarf larkspur—which blooms in early spring—grows only eight to 30 inches high.

BIOLOGY-NATURAL HISTORY: Tall larkspur is an herbaceous perennial member of the Buttercup Family (*Ranunculaceae*). It blooms from July to September. This is another species reaching the northern limit of its range in southern Pennsylvania.

PREFERRED HABITAT: In Pennsylvania, tall larkspur grows on dry, open southwest-facing slopes with limestone soils. Its range extends from southern Pennsylvania, west to Ohio, and south to North Carolina, Tennessee and Missouri.

REASONS FOR BEING ENDANGERED: Of the eight historically recorded plant sites, only one has been located. Most museum records do not contain specific directions, so extensive surveys are needed to search all possible sites. Two additional locations have been found by searching suitable habitat. The three known tall larkspur populations are threatened by roadside herbicide spray, road expansion and limestone quarrying. Tall larkspur is considered a species of concern throughout its natural range and is listed as Endangered in Pennsylvania, Missouri, North Carolina and Tennessee.

MANAGEMENT PROGRAMS: Surveys of historically known locations must be continued. Owners of known sites should be encouraged to protect the plants. Penn DOT and other environmental assessments will help avoid impacts from road construction. In February 1990 tall larkspur was classified as a candidate for federal listing by the USF&WS.



● = verified after 1980 ● = historical occurrences

Variable Sedge

Carex polymorpha Muhl.

IDENTIFYING CHARACTERISTICS: Plants of this genus are grass-like but differ by having triangular rather than round stems. A papery wrapper—unique to sedges—called the perigyna, surrounds the fruit. Variable sedges grow in tufts one to two feet high, with leaves less than a $\frac{1}{4}$ -inch wide. The shoots are reddish at the base. Flower spikes have many tiny flowers without petals but with purplish and reddish-brown scales.



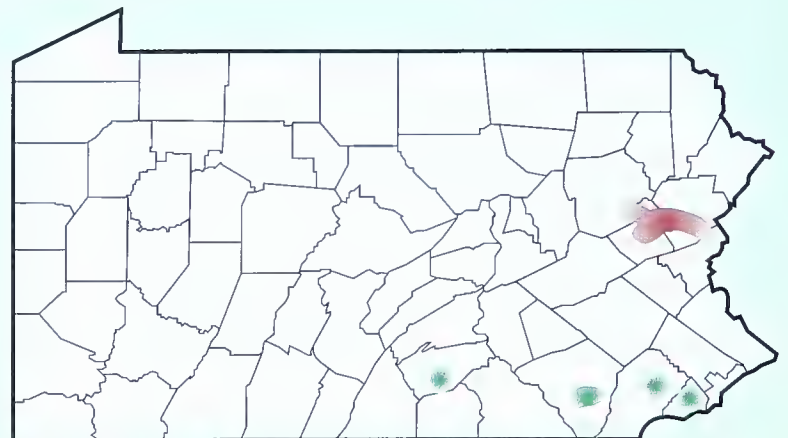
Ann Rhoads, Morris Arboretum

BIOLOGY-NATURAL HISTORY: Variable sedge is a perennial, sending up shoots from a stout, woody rhizome. It flowers from June through August.

PREFERRED HABITAT: The variable sedge is found in open woods, associated with pitch pine, scrub oak or red maple in northeastern Pennsylvania. The substrate is composed of a thin, sandy organic layer which overlays fine-textured, saturated soils. This species grows in approximately 20 scattered colonies from Maine to Virginia.

REASONS FOR BEING ENDANGERED: This rare sedge is considered a species of special concern in the 12 states in which it is known to occur or have occurred. Three sites in southeastern Pennsylvania were destroyed by agriculture or development. Of the eight populations remaining here, three are threatened by second-home development and suburban sprawl.

MANAGEMENT PROGRAMS: The variable sedge is listed as a candidate for federal protection by the USF&WS. Two populations occur on public lands managed by the Bureau of Forestry and Game Commission. These locations may be designated as public plant sanctuaries. A third site occurs within the Appalachian National Scenic trail. The Nature Conservancy and private water authorities own two of the largest populations. Private landowners should be contacted and encouraged to protect plants on their property. Permit review using PNDI will aid in avoiding impact to locations jeopardized by development.



● = verified after 1980 ● = historical occurrences

White Monkshood

Aconitum reclinatum Gray

IDENTIFYING CHARACTERISTICS: White monkshood is an attractive, slender herb with weak trailing stems, usually more than three feet long. Leaves are alternate and deeply cleft into three or five segments. Flowers are white, about $\frac{3}{4}$ -inch long, with a distinctive sepal for which they are named.



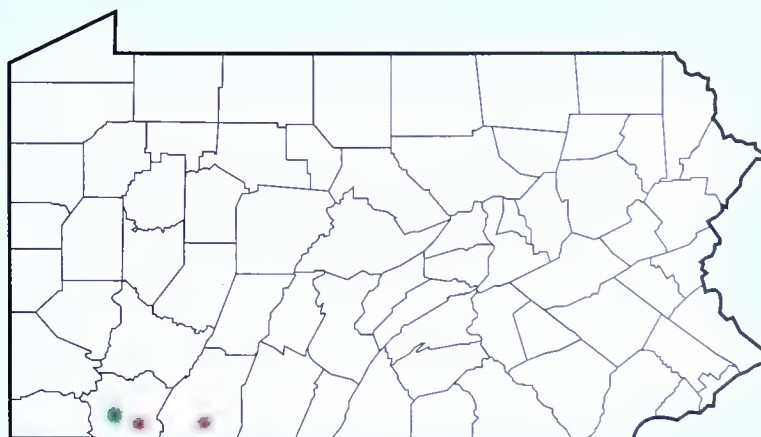
Kathy McKeown, Bureau of Forestry

BIOLOGY-NATURAL HISTORY: The genus *Aconitum* belongs to the Buttercup Family (*Ranunculaceae*). There are three native monkshood species in eastern and central North America; all are rare. Monkshoods are perennials with short tubers. In Europe, garden monkshood is the source of a medicinal drug. Our American species may also have medical uses. Flowers bloom from June to September. White monkshood is rare throughout its range, from Georgia, Tennessee, North and South Carolinas, through Virginia and West Virginia, to its northern limit in Fayette and Somerset counties in Pennsylvania.

PREFERRED HABITAT: White monkshood is found in rich, moist mountain woods, usually along or near streams.

REASONS FOR BEING ENDANGERED: Only three populations have been recorded in Pennsylvania, and one of those has not been seen since 1947. Habitat alteration, water pollution and deer browsing contribute to its rarity. White monkshood is in danger of being lost throughout its natural range. In Pennsylvania one population may have been destroyed by a private logging operation and another is threatened by road and culvert maintenance.

MANAGEMENT PROGRAMS: Known populations should be monitored and potential new sites need to be surveyed. Plants on state forest land are annually surveyed. This location has been proposed for designation as a public plant sanctuary and a deer enclosure has been constructed to prevent herbivory. Permit review using PNDI will help minimize impacts from certain activities on private land.



● = verified after 1980 ● = historical occurrences

Pennsylvania Endangered Plants

SCIENTIFIC NAME

ACONITUM RECLINATUM
 ACORUS AMERICANUS
 AGALINIS PAUPERULA
 ALISMA PLANTAGO-AQUATICA VAR AMERICANA
 ALNUS VIRIDIS
 ALOPECURUS CAROLINIANUS
 AMELANCHIER BARTRAMIANA
 AMMANNIA COCCINEA
 ANEMONE CYLINDRICA
 ARABIS MISSOURIENSIS
 ARETHUSA BULBOSA
 ARNICA ACAULIS
 ARTEMISIA CAMPESTRIS SSP CAUDATA
 ASPLENIUM RESILIENS
 ASTER BOREALIS
 ASTER NEMORALIS
 ASTER SOLIDAGINEUS
 ASTER SPECTABILIS
 ASTRAGALUS NEGLECTUS
 BOLTONIA ASTEROIDES
 CARDAMINE PRATENSIS VAR PALUSTRIS
 CAREX ATHERODES
 CAREX AUREA
 CAREX BEBBII
 CAREX BICKNELLII
 CAREX BULLATA
 CAREX CAREYANA
 CAREX COLLINSII
 CAREX CRINITA VAR BREVICRINIS
 CAREX EBURNEA
 CAREX FORMOSA
 CAREX GARBERI
 CAREX GEYERI
 CAREX GRAVIDA
 CAREX MITCHELLIANA
 CAREX PAUCIFLORA
 CAREX POLYMORPHA
 CAREX PSEUDOCYPERUS
 CAREX RETRORSA
 CAREX TYPHINA
 CAREX VIRIDULA
 CERASTIUM ARVENSE VAR VILLOSISSIMUM
 CHASMANTHIUM LAXUM
 CHENOPODIUM FOGGII
 CHRYSOGONUM VIRGINIANUM
 CIRSIUM HORRIDULUM
 CLADIUM MARISCOIDES
 CLEMATIS VIORNA
 CLETHRA ACUMINATA

COMMON NAME

WHITE MONKSHOOD
 SWEET FLAG
 SMALL-FLOWERED FALSE-FOXGLOVE
 BROAD-LEAVED WATER-PLANTAIN
 MOUNTAIN ALDER
 TUFTED FOXTAIL
 OBLONG-FRUITED SERVICEBERRY
 SCARLET AMMANNIA
 LONG-FRUITED ANEMONE
 MISSOURI ROCK-CRESS
 SWAMP-PINK
 LEOPARD'S-BANE
 BEACH WORMWOOD
 BLACK-STEMMED SPLEENWORT
 RUSH ASTER
 BOG ASTER
 NARROW-LEAVED WHITE-TOPPED ASTER
 LOW SHOWY ASTER
 COOPER'S MILK-VETCH
 ASTER-LIKE BOLTONIA
 CUCKOOFLOWER
 AWNED SEDGE
 GOLDEN-FRUITED SEDGE
 BEBB'S SEDGE
 BICKNELL'S SEDGE
 BULL SEDGE
 CAREY'S SEDGE
 COLLIN'S SEDGE
 SHORT HAIR SEDGE
 EBONY SEDGE
 HANDSOME SEDGE
 ELK SEDGE
 GEYER'S SEDGE
 HEAVY SEDGE
 MITCHELL'S SEDGE
 FEW-FLOWERED SEDGE
 VARIABLE SEDGE
 CYPERUS-LIKE SEDGE
 BACKWARD SEDGE
 CATTAIL SEDGE
 GREEN SEDGE
 MOUSE-EAR CHICKWEED
 SLENDER SEA-OATS
 FOGG'S GOOSEFOOT
 GREEN-AND-GOLD
 HORRIBLE THISTLE
 TWIG RUSH
 VASE-VINE LEATHER-FLOWER
 MOUNTAIN PEPPER-BUSH

Pennsylvania Endangered Plants

SCIENTIFIC NAME

CLITORIA MARIANA
 CONIOSELINUM CHINENSE
 CRYPTOGRAMMA STELLERI
 CYMOPHYLLUS FRASERI
 CYNANCHUM LAEVE
 CYPERUS ACUMINATUS
 CYPERUS DIANDRUS
 CYPERUS HOUGHTONII
 CYPERUS REFRACTUS
 CYPERUS RETRORSUS
 CYPRIPIEDUM PARVIFLORUM
 DELPHINIUM EXALTATUM
 DESMODIUM HUMIFUSUM
 DIARRHENA OBOVATA
 DICENTRA EXIMIA
 DODECATHEON MEADIA
 DRYOPTERIS CAMPYLOPTERA
 ECHINOCHLOA WALTERI
 ELEOCHARIS CARIBAEA
 ELEOCHARIS COMPRESSA
 ELEOCHARIS ELLIPTICA
 ELEOCHARIS OBTUSA VAR PEASEI
 ELEOCHARIS PARVULA
 ELEOCHARIS PAUCIFLORA VAR FERNALDII
 ELEOCHARIS QUADRANGULATA
 ELEOCHARIS ROSTELLATA
 ELEOCHARIS TENUIS VAR VERRUCOSA
 ELEPHANTOPUS CAROLINIANUS
 EPILOBIUM STRICTUM
 EQUISETUM VARIEGATUM
 ERIOPHORUM GRACILE
 ERIOPHORUM TENELLUM
 EUPHORBIA IPECACUANHAE
 EUPHORBIA OBTUSATA
 EUPHORBIA PURPUREA
 FESTUCA PARADOXA
 FRASERA CAROLINIENSIS
 GALIUM LABRADORICUM
 GAYLUSSACIA DUMOSA
 GERANIUM BICKNELLII
 GLYCERIA BOREALIS
 GLYCERIA OBTUSA
 GYMNOPOGON AMBIGUUS
 HELIANTHEMUM BICKNELLII
 HEMICARPHA MICRANTHA
 HETERANTHERA MULTIFLORA
 HIERACIUM TRAILLII
 HIEROCHLOE ODORATA
 HYDROPHYLLUM MACROPHYLLUM
 IODANTHUS PINNATIFIDUS
 IRIS CRISTATA
 IRIS PRISMATICA
 IRIS VERNA
 ISOTRIA MEDEOLOIDES
 JUNCUS BRACHYCARPUS
 JUNCUS DICHOTOMUS
 JUNCUS LONGII
 JUNCUS MILITARIS
 JUNCUS SCIRPOIDES
 LESPEDEZA ANGUSTIFOLIA
 LIGUSTICUM CANADENSE
 LINUM INTERCURSUM

COMMON NAME

BUTTERFLY-PEA
 HEMLOCK-PARSLEY
 SLENDER ROCK-BRAKE
 FRASER'S SEDGE
 SMOOTH SWALLOW-WORT
 SHORT-POINTED FLATSEDGE
 UMBRELLA FLATSEDGE
 HOUGHTON'S FLATSEDGE
 REFLEXED FLATSEDGE
 RETRORSE FLATSEDGE
 SMALL YELLOW LADY'S-SLIPPER
 TALL LARKSPUR
 TRAILING TICK-TREFOIL
 AMERICAN BEAKGRAIN
 WILD BLEEDING-HEARTS
 COMMON SHOOTING-STAR
 MOUNTAIN WOOD FERN
 WALTER'S BARNYARD-GRASS
 CAPITATE SPIKE-RUSH
 FLAT-STEMMED SPIKE-RUSH
 SLENDER SPIKE-RUSH
 WRIGHTS SPIKE RUSH
 LITTLE-SPIKE SPIKE-RUSH
 FEW-FLOWERED SPIKE-RUSH
 FOUR-ANGLED SPIKE-RUSH
 BEAKED SPIKE-RUSH
 SLENDER SPIKE-RUSH
 ELEPHANT'S FOOT
 DOWNEY WILLOW-HERB
 VARIEGATED HORSETAIL
 SLENDER COTTON-GRASS
 ROUGH COTTON-GRASS
 WILD IPECAC
 BLUNT-LEAVED SPURGE
 GLADE SPURGE
 CLUSTER FESCUE
 AMERICAN COLUMBO
 LABRADOR MARSH BEDSTRAW
 DWARF HUCKLEBERRY
 CRANESBILL
 SMALL-FLOATING MANNA-GRASS
 BLUNT MANNA-GRASS
 BROAD-LEAVED BEARDGRASS
 BICKNELL'S HOARY ROCKROSE
 COMMON HEMICARPA
 MULTIFLOWERED MUD-PLANTAIN
 MARYLAND HAWKWEED
 VANILLA SWEET-GRASS
 LARGE-LEAFED WATER-LEAF
 PURPLE ROCKET
 CRESTED DWARF IRIS
 SLENDER BLUE IRIS
 DWARF IRIS
 SMALL-WHORLED POGONIA
 SHORT-FRUITED RUSH
 FORKED RUSH
 LONG'S RUSH
 BAYONET RUSH
 SCIRPUS-LIKE RUSH
 NARROWLEAF BUSHCLOVER
 NONDO LOVAGE
 SANDPLAIN WILD FLAX

Pennsylvania Endangered Plants

SCIENTIFIC NAME

LINUM SULCATUM
 LISTERA AUSTRALIS
 LISTERA CORDATA
 LISTERA SMALLII
 LITHOSPERMUM CAROLINIENSE
 LITHOSPERMUM LATIFOLIUM
 LOBELIA KALMII
 LOBELIA PUBERULA
 LONICERA OBLONGIFOLIA
 LONICERA VILLOSA
 LUDWIGIA DECURRENS
 LUDWIGIA POLYCARPA
 LYCOPODIUM ALOPECUROIDES
 LYCOPODIUM POROPHILUM
 LYCOPUS RUBELLUS
 LYONIA MARIANA
 MARSHALLIA GRANDIFLORA
 MATELEA OBLIQUA
 MEGALODONTA BECKII
 MITELLA NUDA
 MONARDA PUNCTATA
 MONTIA CHAMISSOI
 MUHLENBERGIA UNIFLORA
 MYRIOPHYLLUM EXALBESCENS
 MYRIOPHYLLUM FARWELLII
 MYRIOPHYLLUM HETEROPHYLLUM
 MYRIOPHYLLUM VERTICILLATUM
 NAJAS MARINA
 NELUMBO LUTEA
 ONOSMODIUM HISPIDISSIMUM
 OPHIOGLOSSUM ENGELMANNII
 ORYZOPSIS PUNGENS
 PANICUM AMARUM VAR AMARULUM
 PANICUM SCOPARIUM
 PANICUM XANTHOPHYSUM
 PARNASSIA GLAUCA
 PASSIFLORA LUTEA
 PAXISTIMA CANBYI
 PHLOX OVATA
 PHLOX SUBULATA SSP BRITTONII
 PLATANThERA DILATATA
 PLATANThERA HYPERBOREA
 POA AUTUMNALIS
 POLEMONIUM VANBRUNTIAE
 POLYGALA CRUCIATA
 POLYGALA CURTISSII
 POLYGALA INCARNATA
 POLYGONUM CAREYI
 POLYGONUM SETACEUM VAR INTERJECTUM
 POLYSTICHUM BRAUNII
 POPULUS BALSAMIFERA
 POTAMOGETON FRIESII
 POTAMOGETON GRAMINEUS
 POTAMOGETON HILLII
 POTAMOGETON OBTUSIFOLIUS
 POTAMOGETON PULCHER
 POTAMOGETON STRICTIFOLIUS
 POTAMOGETON TENNESSEENSIS
 POTAMOGETON VASEYI
 POTENTILLA FRUTICOSA
 POTENTILLA PARADOXA
 POTENTILLA TRIDENTATA

COMMON NAME

GROOVED YELLOW FLAX
 SOUTHERN TWAYBLADE
 HEART-LEAVED TWAYBLADE
 KIDNEY-LEAVED TWAYBLADE
 HISPID GROMWELL
 AMERICAN GROMWELL
 BROOK LOBELIA
 DOWNY LOBELIA
 SWAMP FLY HONEYSUCKLE
 MOUNTAIN FLY HONEYSUCKLE
 UPRIGHT PRIMROSE-WILLOW
 FALSE LOOSESTRIPE SEEDBOX
 FOXTAIL CLUBMOSS
 ROCK CLUBMOSS
 TAPER-LEAVED BUGLE-WEED
 STAGGER-BUSH
 LARGE-FLOWERED MARSHALLIA
 OBLIQUE MILKVINE
 BECK'S WATER-MARIGOLD
 NAKED BISHOP'S-CAP
 SPOTTED BEE-BALM
 CHAMISSO'S MINER'S-LETTUCE
 FALL DROPSEED MUHLY
 NORTHERN WATER-MILFOIL
 FARWELL'S WATER-MILFOIL
 BROAD-LEAVED WATER-MILFOIL
 WHORLED WATER-MILFOIL
 HOLLY-LEAVED NAIAD
 AMERICAN LOTUS
 FALSE GROMWELL
 LIMESTONE ADDER'S-TONGUE
 SLENDER MOUNTAIN-RICEGRASS
 SOUTHERN SEA-BEACH PANIC-GRASS
 VELVETY PANIC-GRASS
 SLENDER PANIC-GRASS
 CAROLINA GRASS-OF-PARNASSUS
 PASSION-FLOWER
 CANBY'S MOUNTAIN-LOVER
 MOUNTAIN PHLOX
 MOSS PINK
 LEAFY WHITE ORCHID
 LEAFY NORTHERN GREEN ORCHID
 AUTUMN BLUEGRASS
 JACOB'S-LADDER
 CROSS-LEAVED MILKWORT
 CURTIS'S MILKWORT
 PINK MILKWORT
 CAREY'S SMARTWEED
 A SWAMP SMARTWEED
 BRAUN'S HOLLY FERN
 BALSAM POPLAR
 FRIES' PONDWEED
 GRASSY PONDWEED
 HILL'S PONDWEED
 BLUNT-LEAVED PONDWEED
 SPOTTED PONDWEED
 NARROW-LEAVED PONDWEED
 TENNESSEE PONDWEED
 VASEY'S PONDWEED
 SHRUBBY CINQUEFOIL
 BUSHY CINQUEFOIL
 THREE-TOOTHED CINQUEFOIL

Pennsylvania Endangered Plants

SCIENTIFIC NAME

PRENANTHES CREPIDINEA
 PRUNUS MARITIMA
 PTILIMNIUM CAPILLACEUM
 PYCNANTHEMUM PYCNANTHEMOIDES
 PYCNANTHEMUM TORREI
 QUERCUS FALCATA
 QUERCUS PHELLOS
 QUERCUS SHUMARDII
 RANUNCULUS FASCICULARIS
 RHAMNUS LANCEOLATA
 RHEXIA MARIANA
 RHODODENDRON ATLANTICUM
 RHYNCHOSPORA CAPILLACEA
 RIBES MISSOURIENSE
 RUELLIA HUMILIS
 SAGITTARIA CALYCINA VAR SPONGIOSA
 SCHEUCHZERIA PALUSTRIS
 SCIRPUS ACUTUS
 SCIRPUS ANCISTROCHAETUS
 SCIRPUS SMITHII
 SCIRPUS TORREYI
 SCLERIA MINOR
 SCLERIA RETICULARIS
 SCLERIA VERTICILLATA
 SEDUM ROSEA
 SENECIO ANTENNARIIFOLIUS
 SHEPHERDIA CANADENSIS
 SIDA HERMAPHRODITA
 SISYRINCHIUM ATLANTICUM
 SOLIDAGO ARGUTA VAR HARRISII
 SOLIDAGO CURTISII
 SOLIDAGO ERECTA
 SOLIDAGO SPATHULATA VAR RACEMOSA
 SORBUS DECORA
 SPARGANIUM ANDROCLADUM
 SPIRANTHES CASEI
 SPIRANTHES OVALIS
 SPIRANTHES ROMANZOFFIANA
 SPIRANTHES VERNALIS
 SPOROBOLUS CLANDESTINUS
 SPOROBOLUS CRYPTANDRUS
 SPOROBOLUS HETEROLEPIS
 STACHYS NUTTALLII
 STREPTOPUS AMPLEXIFOLIUS
 TAENIDIA MONTANA
 THALICTRUM CORIACEUM
 TOMANTHERA AURICULATA
 TRICHOSTEMA SETACEUM
 TRIFOLIUM VIRGINICUM
 TRIPHORA TRIANTHOPHORA
 TRIPLASIS PURPUREA
 TROLLIUS LAXUS SSP LAXUS
 UTRICULARIA RADIATA
 VERNONIA GLAUCA
 VIBURNUM NUDUM
 VIOLA BRITTONIANA
 VIOLA PEDATIFIDA
 VITIS NOVAE-ANGLIAE

COMMON NAME

CREPIS RATTLESNAKE-ROOT
 BEACH PLUM
 MOCK BISHOP-WEED
 SOUTHERN MOUNTAIN-MINT
 TORREY'S MOUNTAIN-MINT
 SOUTHERN RED OAK
 WILLOW OAK
 SHUMARD'S OAK
 TUFTED BUTTERCUP
 LANCEOLATE BUCKTHORN
 MARYLAND MEADOW-BEAUTY
 DWARF AZALEA
 CAPILLARY BEAKED-RUSH
 MISSOURI GOOSEBERRY
 FRINGED-LEAVED PETUNIA
 LONG-LOBED ARROW-HEAD
 POD-GRASS
 HARD-STEMMED BULLRUSH
 NORTHEASTERN BULLRUSH
 SMITH'S BULLRUSH
 TORREY'S BULLRUSH
 MINOR NUTRUSH
 RETICULATED NUTRUSH
 WHORLED NUTRUSH
 ROSE-ROOT STONECROP
 CAT'S-PAW RAGWORT
 CANADA BUFFALO-BERRY
 SIDA
 EASTERN BLUE-EYED GRASS
 HARRIS' GOLDEN-ROD
 CURTIS' GOLDEN-ROD
 SLENDER GOLDEN-ROD
 STICKY GOLDEN-ROD
 SHOWY MOUNTAIN-ASH
 BRANCHING BUR-REED
 CASE'S LADIES'-TRESSES
 OCTOBER LADIES'-TRESSES
 HOODED LADIES'-TRESSES
 SPRING LADIES'-TRESSES
 ROUGH DROPSEED
 SAND DROPSEED
 PRAIRIE DROPSEED
 NUTTALL'S HEDGE-NETTLE
 WHITE TWISTED-STALK
 MOUNTAIN PIMPERNEL
 THICK-LEAVED MEADOW-RUE
 EARED FALSE-FOXGLOVE
 BLUE-CURLS
 KATE'S MOUNTAIN CLOVER
 NODDING POGONIA
 PURPLE SANDGRASS
 SPREADING GLOBE FLOWER
 FLOATING BLADDERWORT
 TAWNY IRONWEED
 POSSUM HAW VIBURNUM
 COAST VIOLET
 PRAIRIE VIOLET
 A GRAPE

Pennsylvania Threatened Plants

SCIENTIFIC NAME

ACONITUM UNCINATUM
 AMMOPHILA BREVILIGULATA
 ARCEUTHOBIMUM PUSILLUM
 ARISTIDA PURPURASCENS
 ASPLENium BRADLEYI
 ASTER DEPAUPERATUS
 ASTER NOVI-BELGII
 BIDENS BIDENTOIDES
 BOUTELOUA CURTIPENDULA
 CAMASSIA SCILLOIDES
 CAREX ALATA
 CAREX AQUATILIS
 CAREX CRYPTOLEPIS
 CAREX DIANDRA
 CAREX FLAVA
 CAREX OLIGOSPERMA
 CAREX PAUPERCULA
 CAREX PRAIREA
 CAREX SCHWEINITZII
 CAREX STERILIS
 CAREX TETANICA
 CAREX WIEGANDII
 CHAMAESYCE POLYGONIFOLIA
 CHRYSOPSIS MARIANA
 CIMICIFUGA AMERICANA
 CYPRIPIEDUM REGINAE
 DIGITARIA COGNATUM
 DODECATHEON AMETHYSTINUM
 ELEOCHARIS INTERMEDIA
 ELEOCHARIS ROBBINSII
 ELLISIA NYCTELEA
 ERIGENIA BULBOSA
 ERIOPHORUM VIRIDICARINATUM
 EUTHAMIA TENUIFOLIA
 FIMBRISTYLIS ANNUA
 GAYLUSSACIA BRACHYCERA
 HYPERICUM DENSIFLORUM
 HYPERICUM MAJUS
 ILEX OPACA
 JUNCUS ALPINUS
 JUNCUS BALTICUS
 JUNCUS BRACHYCEPHALUS
 JUNCUS TORREYI
 LATHYRUS JAPONICUS
 LATHYRUS OCHROLEUCUS
 LINNAEA BOREALIS
 LOBELIA DORTMANNA
 LYCOPODIUM APPRESSUM
 MAGNOLIA TRIPETALA

COMMON NAME

BLUE MONKSHOOD
 AMERICAN BEACHGRASS
 DWARF MISTLETOE
 ARROW-FEATHERED THREE AWNED
 BRADLEY'S SPLEENWORT
 SERPENTINE ASTER
 LONG-LEAVED ASTER
 SWAMP BEGGAR-TICKS
 TALL GRAMMA
 WILD HYACINTH
 BROAD-WINGED SEDGE
 WATER SEDGE
 NORTHEASTERN SEDGE
 LESSER PANICLED SEDGE
 YELLOW SEDGE
 FEW-SEEDED SEDGE
 BOG SEDGE
 PRAIRIE SEDGE
 SCHWEINITZ'S SEDGE
 ATLANTIC SEDGE
 WOOD'S SEDGE
 WIEGANDS SEDGE
 SMALL SEA-SIDE SPURGE
 MARYLAND GOLDEN-ASTER
 MOUNTAIN BUGBANE
 SHOWY LADY'S-SLIPPER
 FALL WITCH-GRASS
 JEWELLED SHOOTING-STAR
 MATTED SPIKE-RUSH
 ROBBINS' SPIKE-RUSH
 ELLISIA
 HARBINGER-OF-SPRING
 THIN-LEAVED COTTON-GRASS
 GRASS-LEAVED GOLDENROD
 ANNUAL FIMBRY
 BOX HUCKLEBERRY
 BUSHY ST. JOHN'S-WORT
 LARGER CANADIAN ST. JOHN'S-WORT
 AMERICAN HOLLY
 RICHARDSON'S RUSH
 BALTIC RUSH
 SMALL-HEADED RUSH
 TORREY'S RUSH
 BEACH PEAVINE
 WILD-PEA
 TWINFLOWER
 WATER LOBELIA
 SOUTHERN BOG CLUBMOSS
 UMBRELLA MAGNOLIA

Pennsylvania Threatened Plants

SCIENTIFIC NAME

MAGNOLIA VIRGINIANA
MELICA NITENS
MINUARTIA GLABRA
MYRICA GALE
MYRIOPHYLLUM TENELLUM
NAJAS GRACILLIMA
NYMPHOIDES CORDATA
OENOTHERA ARGILLICOLA
PANICUM TUCKERMANII
POA PALUDIGENA
POLYGONUM ROBUSTIUS
POTAMOGETON CONFEROIDES
POTAMOGETON RICHARDSONII
POTENTILLA ANSERINA
PTELEA TRIFOLIATA
RANUNCULUS LONGIROSTRIS
RIBES TRISTE
RUELLIA STREPENS
SALIX CANDIDA
SALIX SERISSIMA
SCIRPUS PEDICELLATUS
SCLERIA PAUCIFLORA
SPIRAEA BETULIFOLIA
TALINUM TERETIFOLIUM
UTRICULARIA INTERMEDIA
UTRICULARIA MINOR
VIOLA APPALACHIENSIS
VITTARIA APPALACHIANA

COMMON NAME

SWEET BAY MAGNOLIA
THREE-FLOWERED MELIC-GRASS
APPALACHIAN SANDWORT
SWEET BAYBERRY
SLENDER WATER-MILFOIL
BUSHY NAIAD
FLOATING-HEART
SHALE-BARREN EVENING-PRIMROSE
TUCKERMAN'S PANIC-GRASS
BOG BLUEGRASS
ROBUST SMARTWEED
TUCKERMAN'S PONDWEED
RED-HEAD PONDWEED
SILVERWEED
COMMON HOP-TREE
EASTERN WHITE WATER-CROWFOOT
RED CURRANT
LIMESTONE PETUNIA
HOARY WILLOW
AUTUMN WILLOW
STALKED BULLRUSH
FEW FLOWERED NUTRUSH
DWARF SPIRAEA
ROUND-LEAVED FAME-FLOWER
FLAT-LEAVED BLADDERWORT
LESSER BLADDERWORT
APPALACHIAN BLUE VIOLET
APPALACHIAN GAMETOPHYTE FERN

Pennsylvania's Wild Species

The Box Score

<i>Taxon</i>	<i>Species (sub species) Total Taxa</i>
Mammals	63
Birds (breeding species)	188
Amphibians	36
Reptiles	37
Fish	159
Invertebrates	15,000 +/-
Vascular Plants (native)	2,076
Mosses, Liverworts & Lichens	625 +/-
Fungi	200 +/-
Algae, Protozoa & Slime Mold	5,000 +/-

The last word in ignorance is the man who says of an animal or plant "what good is it?". If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.

—Aldo Leopold (1949)

Wild Resource Conservation Fund

The Wild Resource Conservation Act or Act 1982-170, was established by the Pennsylvania Legislature to help finance wildlife diversity and native wild plant programs. Through this act, the Wild Resource Conservation Fund was created to be a means of financing management work to be carried out under the program. Act 1982-170 is unique because it protects and manages native wild plants. Important research is currently being done to identify special wild plant populations within Pennsylvania's native flora.

Citizens of the Commonwealth can support the management and protection of native wild plants and wildlife diversity by voluntarily contributing all or a portion of their state income tax refund to the Wild Resource Conservation Fund. Another way to contribute is through the purchase of the Wild Resource Conservation Fund license plate. The cost of the plate is \$35, with \$15 passed on to the fund. The plate has currently sold 200,000 issues. If you don't receive a state tax refund or choose to purchase a license plate, you may make a direct contribution to the fund. Monies raised to support the program may be done through private contributions. No money from the general fund of the State Treasury is used to support the Wild Resource Conservation Fund.

To send a contribution or to get more information about the Wild Resource Conservation Fund write to: Wild Resource Conservation Fund, PO Box 8764, Harrisburg, PA 17105-8764.

To Teachers

Endangered species, both plants and animals, are important records of how people have treated their environment. If you and your students study the material written about each species, it quickly becomes apparent that the greatest threat to these plants and animals is habitat loss.

Habitat loss occurs in many forms. Wetland drainage is a major threat to many species. Pollution, urban sprawl, acid rain, poor agricultural practices and aggressive non-native species also imperil many native plants and animals. All of these practices, by themselves or in combination, have had major impacts on living organisms.

Biological, economic, social and ethical lessons can be learned from studying endangered and threatened species. Whether used as a science text, a reading lesson, social studies unit or art project, the major theme that runs through this book is the need to make people more aware of what mankind has done to our environment and what can be done to ensure a viable future.

For more information on endangered and threatened species and other environmental education subjects, contact the following sources:

Pennsylvania Wild Resource Conservation Fund

P O Box 8764
Harrisburg, PA 17105-8764

Department of Conservation and Natural Resources

Bureau of Forestry (Plant Program)
Forest Advisory Services
P O Box 8552
Harrisburg, PA 17105-8552

Pennsylvania Fish & Boat Commission

Keystone Aquatic Resource Education (KARE)
P O Box 1673
Harrisburg, PA 17105-1673

Pennsylvania Game Commission

Project WILD
2001 Elmerton Ave.
Harrisburg, PA 17110-9797

front cover photos- Bald Eagle-Hal Korber; Swamp Pink-Ann Rhoads, Morris Arboretum;
Red-Bellied Turtle-Robert T. Zappalorti, Nature's Images; Regal Fritillary Butterfly-Clark Shiffer

back cover photos- Northern Riffleshell Clam-Rob Criswell; Great Egret-Rob Criswell; Green Salamander-Russ Gettig;
Coastal Plain Leopard Frog-Robert T. Zappalorti, Nature's Images; Short-Eared Owl-Rob Criswell;
Glade Spurge-Ann Rhoads, Morris Arboretum; Eastern Massasauga Rattlesnake-Clark Shiffer

